
3. THE CALFED PROGRAM PLAN

CALFED has developed a long-term comprehensive plan to restore ecological health and improve water management for beneficial uses of the Bay-Delta system. To achieve this mission CALFED seeks to restore ecological health, improve water quality, improve water supply reliability, and ensure levee and channel integrity. This chapter describes CALFED's **comprehensive resource management strategy** (the program plan being developed for successful implementation of the preferred alternative) and the **Preferred Program Alternative** (a concise description of program actions in Section 3.7).

The comprehensive resource management strategy distinguishes CALFED from previous efforts to solve Bay-Delta problems. The resource problems of the Bay-Delta are all interrelated, and actions to solve these problems are related as well. Thus, the actions that CALFED implements will be selected to yield multiple benefits, providing a comprehensive solution that is more effective and more efficient than single-purpose actions could be. See Chapter 4 for more specific Stage 1 actions.

The Preferred Program Alternative is a set of programmatic actions, studies, and conditional decisions. It includes the broadly described actions that set the long-term overall direction of the Program. The description of the alternative is programmatic in nature, intended to help agencies and the public make decisions on the broad methods to meet program purposes. The Preferred Program Alternative description is an important legal element of compliance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). The Preferred Program Alternative description is at the end of this chapter. The alternative is not intended to define the site specific actions that will ultimately be implemented.

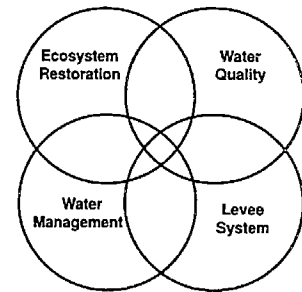
3.1 Overview of the Preferred Program Alternative

The most significant aspect of the CALFED Preferred Program Alternative is its comprehensive nature. The Program is more than a collection of diverse actions to achieve four objectives. The preferred alternative begins with strategies for solving each of the four Bay-Delta problem areas in an integrated manner. These strategies are interwoven and each must be viewed in the context of the other strategies. For example, to fully implement the Ecosystem Restoration Program, CALFED must also have a successful strategy to provide the improved water quality that is needed by the ecosystem. The levee strategy provides new opportunities for improving levee-associated habitat for Delta species. Also, water will be more available for environmental uses due to improved water supply reliability. Adaptive management is an essential program concept, part of each of these strategies. It is necessary to monitor the system continuously and adapt actions that are taken to restore ecological health and improve water management.

CALFED has developed eight programs, or categories of actions, that contribute to carrying out the strategies. These eight programs include a Long-term Levee Protection Plan, a Water Quality Program, an Ecosystem Restoration Program, a Water Use Efficiency Program, a Water Transfers Program, a Watershed Program, water storage, and Delta conveyance.

Summary of Strategies for the Four Problem Areas

Ecosystem Restoration CALFED's Ecosystem Restoration Program is the largest, most comprehensive, and most inclusive environmental restoration program in the United States. It provides a new perspective to restoration science by focusing on the rehabilitation, protection or restoration of ecological processes that create and maintain habitats needed by fish, wildlife and plant species dependent on the Delta and its tributary systems. This strategy emphasizes solid science, adaptive management and local participation: an innovative approach that is becoming a model for similar efforts throughout the nation. By restoring the natural processes that create and maintain diverse and vital habitats, CALFED aims to meet the needs of multiple plant and animal species while reducing the amount of human intervention required to maintain habitats.



Water Quality CALFED's objective is to provide good water quality for all beneficial uses, and its strategy includes reducing or eliminating parameters that degrade water quality at their sources. In addition, CALFED is committed to continuously improving source water quality that allows municipal water suppliers to deliver safe and affordable drinking water that reliably meets and, where feasible, exceeds applicable drinking water standards. CALFED Program actions will aim to reduce the levels of problem contaminants such as bromide, organic carbon, and pathogens in Delta drinking water sources.

Levees Levees are critical to the physical integrity of the Delta and Suisun Marsh, and the integrity of the state's water system. CALFED will work to reconstruct all Delta levees to an adequate base level of protection. CALFED will perform risk assessment of all factors that can contribute to levee failure and the consequences of failure to Delta land uses, the ecosystem, water quality and water supply reliability, and implement appropriate risk management considering all available options. Levee improvements will incorporate successful techniques for restoring, enhancing or protecting ecosystem values.

Water Supply Reliability The CALFED Program has proposed a Water Management Strategy to improve water supply reliability that recognizes the variability of water supply and demand in California. CALFED's water supply reliability goals are to: increase the utility of available water supplies (making water suitable for more uses and reuses); improve access to existing or new water supplies in an economically efficient manner for environmental, urban, and agricultural beneficial uses; and to improve flexibility of managing water supply and demand in order to reduce conflicts between beneficial uses, improve access to water supplies, and decrease system vulnerability.

Several general categories of tools are included in the Water Management Strategy, all of which are being used in California to some degree: water conservation; water recycling; water transfers, both short-term and long-term; storage, both groundwater and surface water; water project

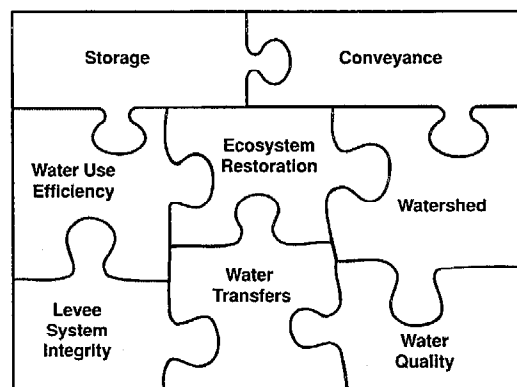
operations; Delta conveyance modifications; watershed management; water quality control; and monitoring and real-time diversion management.

A creative new component of this strategy is an Environmental Water Account (EWA). Through the EWA, environmental managers will control a package of assets including water and money that provides greater flexibility in helping fish species recover. With an EWA, decision-makers can react quickly to real-time assessments of fish occurrence and vulnerability instead of relying completely on fixed operational requirements based on “typical” fish behavior patterns. The EWA is described in more detail later in this chapter as an element of CALFED’s Water Management Strategy.

Program Elements

CALFED developed eight programs to carry out the strategies described above. The Preferred Program Alternative is comprised of these program elements that will be implemented in stages over the next 30 years. Each of the elements contributes to improvements in the four problem areas. The program elements include:

- **Long-Term Levee Protection Plan** - Provides significant improvements in the reliability of levees in the CALFED problem area to benefit all users of Delta and Suisun Marsh water and land.
- **Water Quality Program** - Makes significant reductions in point and non-point source pollution for the benefit of all water uses and the Bay-Delta ecosystem.
- **Ecosystem Restoration Program** - Provides significant improvements in habitat, restoration of critical ecological processes and species populations, and reduces conflict with other Bay-Delta system resources.
- **Water Use Efficiency Program** - Encourages efficient use of water for agricultural, urban, and environmental purposes by providing support and incentives at the local level including expanded planning, technical, and financial assistance.
- **Water Transfers Program** - Provides a framework of actions, policies, and processes to facilitate, encourage, and streamline an active and properly regulated water market which will allow water to move between users, including environmental uses, on a voluntary and compensated basis.



- **Watershed Program** - Promotes locally-led watershed management activities and protections relevant to achieving CALFED goals through financial and technical assistance.
- **Storage** - New groundwater and surface storage will be developed and constructed, together with aggressive implementation of water conservation, recycling, and a protective water transfer market, as appropriate to meet CALFED Program goals. During Stage 1, CALFED will pursue a mix of surface water and groundwater storage. Future site-specific evaluations, environmental review processes, and permitting will be coordinated under CALFED's Integrated Storage Investigation.
- **Delta Conveyance** - CALFED will develop a through-Delta conveyance alternative based on the existing Delta configuration with some modifications, evaluate its effectiveness, and add additional conveyance and/or other water management actions if necessary to achieve CALFED goals and objectives. For example, inability to meet CALFED Program goals for drinking water quality or fishery recovery using this strategy could lead to a decision to move forward with modifications to this strategy including an isolated facility to carry a portion of export water around the Delta and/or other water management options.

All of these program elements will employ an adaptive management approach with careful monitoring of performance to help modify (adapt) future actions as more is learned about the system and how it responds. The implementation of the Preferred Program Alternative is supported by: an Implementation Plan that describes Stage 1 actions, governance, and financing; and a CALFED Science Program to carry out monitoring, assessment and research.

Staged Implementation and Staged Decision Making

The selection of a Preferred Programmatic Alternative provides the broad resource framework and strategy for implementing a comprehensive program over a period of thirty years or more. This program will be implemented in stages. The programmatic decision sets in motion the implementation of some actions, as

Staged Implementation

- **Identify certain actions at the outset (for all stages).**
- **Identify possible actions for future stages with associated conditions and linkages to guide the decisions.** This will allow some decisions when more scientific information will be available and the effects of previous actions will be better known.
- **Stage assurances** that include specific agreements among agencies and stakeholders

well as additional planning and investigation to refine other actions. The challenge in implementing the Program in stages is to allow actions that are ready to be taken immediately to go forward, while assuring that everyone has a stake in the successful completion of each stage. Throughout the implementation period, monitoring will provide information about conditions in the Bay-Delta and results of these actions, so that future actions can be adapted accordingly.

The individual actions proposed by CALFED cover a spectrum from those that are small, simple, and well understood to those that would involve major modifications to the Bay-Delta system and need additional refinement before implementation can occur. Actions carried out during Stage 1 of implementation -- the first seven years after the Record of Decision -- will generally be more straightforward actions for which there is strong scientific understanding and justification. These actions can and should be implemented quickly to achieve early program benefits. Other actions implemented early will be designed to test hypotheses and conceptual models. Results will be monitored to determine if the expected results occur. If not, subsequent actions can be modified accordingly.

Actions that will involve greater uncertainty, or will make significant or irreversible modification to the system will be implemented later during Stage 1, or in subsequent stages of the implementation period. These actions will need to be carefully planned and structured because they will be less easily modified through adaptive management.

Staged implementation for the CALFED Preferred Program Alternative involves identifying implementation actions for which there is general agreement and justification, and also developing conditions for future decisions and for moving beyond Stage 1. For some actions, predefined conditions would need to be met before actions could proceed. For example, certain conditions would be linked to decisions to construct major facilities. These linked decisions on several program elements may be required at each stage of implementation. These require assurances that linkages, such as performance measures for each program element, are satisfied before making a decision to proceed.

Like implementation, the decision process will be staged to allow better decisions in adaptive management at the appropriate time. The programmatic nature of the EIS/EIR provides the general direction for long-term implementation but not the specific information necessary for every decision required during the 30 year implementation period. Not all decisions need to, or can, be made at the outset of implementation. Therefore, stages will be identified where there are logical implementation milestones and decision making points. In this way, adaptive management can be applied equally well to a series of incremental actions such as ecosystem restoration or for major single decision projects such as surface storage.

Staged decision making also facilitates the development of program linkages and conditions. CALFED recognizes the critical importance of developing assurances mechanisms to provide stakeholder groups with some certainty that program elements will be implemented over time

and in concert with other program elements. CALFED discusses some potential linkages and conditions in Chapter 4, below, as it describes program implementation in Stage 1. Staged decision making on certain program elements provides an opportunity to evaluate and adjust the linkages and conditions to assure that the program is moving forward in a comprehensive and balanced manner.

Meeting the CALFED mission statement and goals is dependent on improvement in all problem areas (ecosystem, water quality, levee system integrity, and water supply reliability). Linkages between improvement in the problem areas are key to consistent and continuous progress towards meeting the CALFED purposes. The eight program elements and linkages between the elements are the mechanisms to achieve improvement in the four problem areas.

3.2 A Comprehensive Resource Management Program

The most significant aspect of the CALFED Preferred Program Alternative is its comprehensive nature. It is founded upon strategies for solving each of the four Bay-Delta problem areas in an integrated manner. These strategies are interwoven and each must be viewed in the context of the other strategies. This integration is also reflected in proposed Program actions. Nearly every action proposed will provide benefits in two or more resource areas at the same time, thus increasing program benefits and minimizing costs. In addition, there is synergy among actions that are geographically or functionally related. This comprehensive and integrated Program is like a braided rope: the intact rope is much stronger than the strands from which it is made.

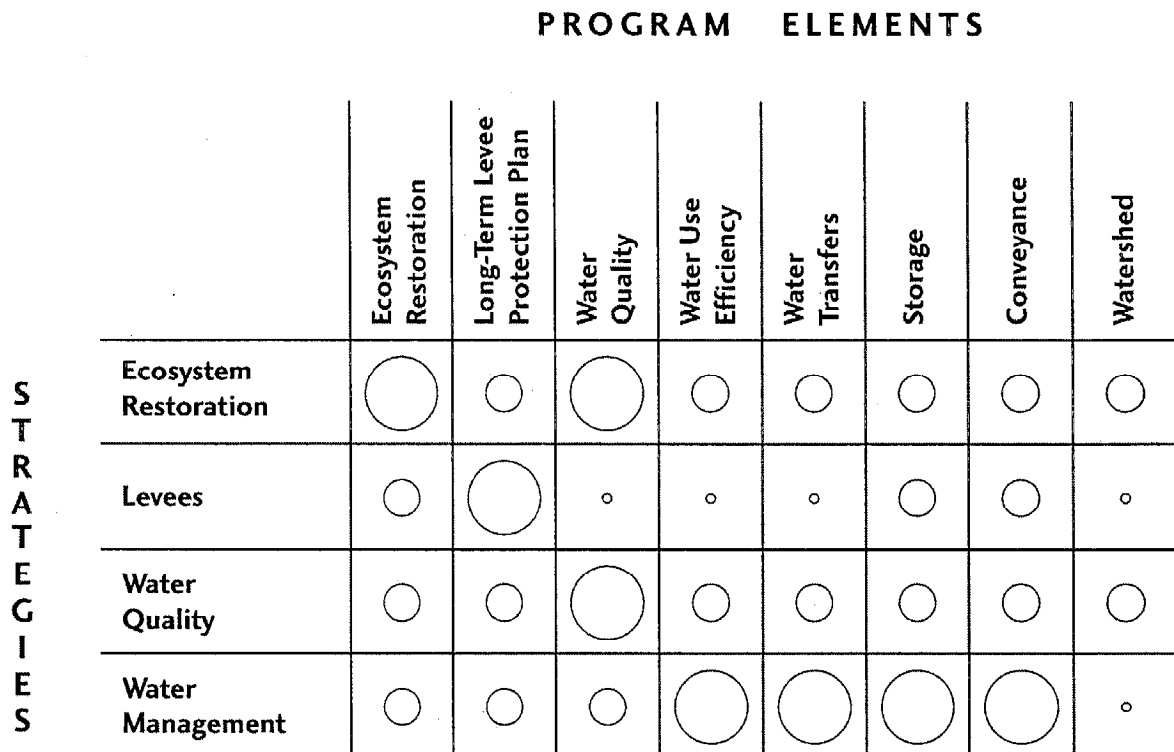
If the Program as a whole is like a rope, then the four strands in the rope are the resource management strategies that CALFED has developed. These four strategies are the ways that CALFED will restore ecosystem health, provide good water quality, maintain the integrity of the levee and channel system, and improve water supply reliability. These strategies, summarized earlier in this chapter, are described in detail below.

These four strategies reflect additional program integration. Each strategy will meet program objectives through implementation of many actions over a period of years. To simplify the discussion of the CALFED programmatic alternative, the actions are grouped under eight program elements: a Long-Term Levee Protection Plan, a Water Quality Program, an Ecosystem Restoration Program, a Water Use Efficiency Program, a Water Transfers Program, a Watershed Program, Storage, and Delta Conveyance. These eight program elements have been depicted as an interlocking jigsaw puzzle. The puzzle, however, provides an incomplete picture of the comprehensive interrelationships of program elements and resource management strategies.

To complete the rope analogy, these eight program elements are like fibers used to make up the four rope strands, which in turn are braided into a complete rope. None of the fibers or strands

by themselves are as strong as the whole rope; the strength comes from the way all the pieces are braided together.

The relationship of the four CALFED resource management strategies and the eight program elements is shown in the figure below. Each row represents a resource management strategy, and each column represents one of the eight program elements. The size of the dots estimates the relative contribution of potential actions in a program element toward meeting the objectives of each resource management strategy. This graphic shows how actions in all eight program elements may be integrated into a single resource management strategy.

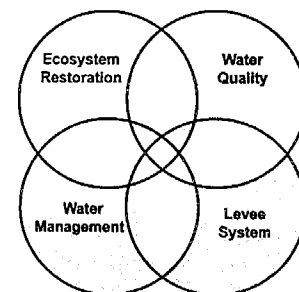


Among the eight program elements, there are comprehensive program plans for six. These plans describe actions related to ecosystem restoration, water quality, levee and channel integrity, water transfers, water use efficiency, and watershed management. These program plans are included as separate appendices to this *Programmatic EIS/EIR*. Among the eight program elements, only storage and conveyance are not described in separate program plans.

Three of these program elements -- ecosystem restoration, water quality, and levees -- correspond to broader resource management strategies. The fourth resource management strategy, CALFED's Water Management Strategy, relies most heavily on program elements for water use efficiency, water transfers, storage, and Delta conveyance. The four strategies are described in the following sections.

3.3 Ecosystem Restoration Strategy

The CALFED ecosystem restoration objective is to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plants and animal species. All CALFED program elements will contribute in varying degrees to this objective, with the Ecosystem Restoration Program (ERP) being the principal program element designed to restore the ecological health of the Bay-Delta ecosystem. The ERP includes actions throughout the Bay-Delta watershed, focusing on the restoration of ecological processes and important habitats.



Coordination and integration of actions -- not only within the CALFED Program, but among all resource management, conservation, and regulatory actions affecting the Bay-Delta System -- will be essential to successful restoration. Therefore, CALFED has proposed the establishment of a single blueprint for ecosystem restoration and species recovery. This concept is discussed in Section 3.8 of this chapter.

CALFED strives to improve ecosystem quality for the Bay-Delta system in order to reduce conflicts among beneficial uses of California's water. To help plan CALFED efforts to meet the overall objective, CALFED worked with a diverse group of representatives from CALFED agencies, academia, and the stakeholder community. They developed a Strategic Plan for Ecosystem Restoration. The Strategic Plan describes the ecosystem-based, adaptive management approach that will be used to implement the restoration program. Specifically, the Strategic Plan:

- Describes an ecosystem based management approach for restoring and managing the Bay-Delta ecosystem.
- Describes an adaptive management process that is sufficiently flexible and iterative to respond to changing Bay-Delta conditions and to incorporate new information about ecosystem structure and function.
- Describes the value and application of conceptual models in developing restoration actions and defining information needs, with examples of their development and use.
- Describes institutional and administrative considerations necessary to implement adaptive management, to ensure scientific credibility of the restoration program and to engage the public in the restoration program.

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- Presents goals and objectives for recovery of species and ecosystem restoration.
 - Presents broad issues that need to be addressed early in the restoration program.
 - Presents decision rules and criteria to help guide the selection and prioritization of restoration actions.
 - Describes the opportunities and constraints to be considered in developing a restoration program.
 - Outlines a Stage 1 action plan for selecting and implementing restoration actions during the first seven years of implementation.

An important part of the Strategic Plan is the set of goals for ecosystem restoration, which CALFED has adopted. The goals provide the basis for a vision of a desired future condition of the Bay-Delta system. They lead to a definition of what is meant by “ecosystem quality” as applied to the Bay-Delta system. These CALFED goals for ecosystem restoration are:

1. Achieve recovery of at-risk native species dependent on the Delta and Suisun Bay as the first step toward establishing large, self-sustaining populations of these species; support similar recovery of at-risk native species in the Bay-Delta estuary and the watershed above the estuary; and minimize the need for future endangered species listings by reversing downward population trends of native species that are not listed.
2. Rehabilitate natural processes in the Bay-Delta estuary and its watershed to fully support, with minimal ongoing human intervention, natural aquatic and associated terrestrial biotic communities and habitats, in ways that favor native members of those communities.
3. Maintain and/or enhance populations of selected species for sustainable commercial and recreational harvest, consistent with the other ERP strategic goals.
4. Protect and/or restore functional habitat types in the Bay-Delta estuary and its watershed for ecological and public values such as supporting species and biotic communities, ecological processes, recreation, scientific research, and aesthetics.
5. Prevent the establishment of additional non-native invasive species and reduce the negative ecological and economic impacts of established non-native species in the Bay-Delta estuary and its watershed.

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6. Improve and/or maintain water and sediment quality conditions that fully support healthy and diverse aquatic ecosystems in the Bay-Delta estuary and watershed; and eliminate, to the extent possible, toxic impacts to aquatic organisms, wildlife, and people.

The *Strategic Plan for Ecosystem Restoration* is included as another appendix to the Programmatic EIS/EIR. Consistent with adaptive management, the Strategic Plan will be refined over time as we learn more about the ecosystem and the effects of restoration actions.

Fundamental to the CALFED strategy for ecosystem restoration is the restoration of *ecological processes* associated with streamflow, stream channels, Delta channel hydraulics, watersheds, and floodplains. These ecological processes create and maintain habitats essential to the life history of species dependent on the Bay-Delta system. By restoring the natural processes that create and maintain diverse and vital habitats, CALFED aims to meet the needs of multiple plant and animal species while reducing the amount of human intervention required to maintain habitats. In addition, the strategy includes reduction in the effects of stressors that inhibit ecological processes, habitats, and species.

Representative ERP actions include:

- Restoring, protecting, and managing diverse habitat types representative of the Bay-Delta and its watershed
- Restoring timing and magnitude of critical instream flows and providing periodic high flows for channel-forming in Bay-Delta tributaries
- Increasing Delta outflow during key springtime periods
- Reconnecting Bay-Delta tributaries with their floodplains through the construction of setback levees, the acquisition of flood easements, and the construction and expansion of flood bypasses
- Developing assessment, prevention, and control programs for invasive species
- Restoring a healthy sediment regime by relocating instream and floodplain gravel mining, and by artificially introducing gravels to compensate for sediment trapped by dams
- Reducing or eliminating fish passage barriers, including the removal of dams, construction of fish ladders, and construction of best available technology fish screens

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- Targeting research to provide information needed to define problems sufficiently and to design and prioritize restoration actions

Because the Bay-Delta ecosystem is large, complex, diverse and variable, it is impossible to know with certainty how it will respond to implementation of the ERP and other program elements. Although we know much about how the Bay-Delta system functions, there are still significant information gaps that hamper our ability to sufficiently define problems and design restoration actions to solve them. To account for this uncertainty, CALFED will use an adaptive management approach to restoring and managing the Bay-Delta ecosystem. In an adaptive management approach, restoration actions are designed and monitored so that they improve our understanding of the system while simultaneously restoring it. This approach allows revision of restoration activities or better design of future restoration actions based upon the information gathered from projects implemented earlier. It also provides the flexibility required to respond to changing Bay-Delta conditions and to identify and resolve resource conflicts and trade-offs.

The Strategic Plan outlines the following steps as part of the adaptive management approach:

- Define the problem or set of problems to be addressed
- Define goals and objectives for resolving identified problems
- Develop conceptual models
- Develop and design alternative restoration or management actions
- Implement restoration actions
- Monitor the ecosystem
- Update restoration and management actions

The CALFED Science Program will provide the means to measure progress made toward the ecosystem restoration goals and objectives. It will identify the need to make changes through adaptive management and it will provide focus on research needs to reduce scientific uncertainty. The CALFED Science Program is described in greater detail in Chapter 4.

Throughout the adaptive management process, CALFED will rely on the advice of expert panels, particularly the ERP Science Review Panel that is identified in the Strategic Plan. These panels will assess the results of CALFED actions, monitoring and research data from the Science Program, and other relevant information to provide advice to CALFED regarding future monitoring, research, and program actions. Such advice will be particularly relevant to decisions on future ecosystem restoration actions, as well as decisions regarding future conveyance and storage actions that will affect ecosystem restoration. CALFED will use this adaptive management process to refine and implement the 600 programmatic restoration actions contained in the ERP.

ERP Priority Setting and Implementation

The ERP identifies over 600 programmatic actions to be implemented throughout the Bay-Delta system over the 30-year period of the CALFED Program. Implementation of the ERP will be carried out according to a set of broad policy principles that form the foundation for priority-setting and funding allocation decisions. These principles were developed through close collaboration between CALFED agencies and stakeholders. These principles specifically address the process for developing near-term and long-term ERP actions, the role of science-based adaptive management and the parameters for determining the balance of funding priorities and allocation. They are included as part of the ERP Strategic Plan, as follows:

Basis for ERP Implementation Priorities: The development of annual, near-term and long-term ERP implementation priorities and strategies will be based on the goals and objectives of the ERP Strategic Plan, Multi-species Conservation Strategy, ESA recovery plans, and implementation plans developed for specific ecological management zones, and informed by a science-based adaptive management process.

Role of Science: A science based adaptive management process will be used to review and advise on ERP strategies and priorities. This process will include adequate monitoring, research, and performance assessment activities, and an independent Ecosystem Science Panel. CALFED is committed to using the best available science for ERP implementation in accordance with a single blueprint.

Setting Priorities: Final decisions regarding ERP implementation strategies, priorities, and funding allocations will be made by the CALFED Policy Group or its successor entity, based on recommendations developed through a collaborative effort involving the CALFED Science Program (including an Ecosystem Science Panel), CALFED agencies, stakeholders, and the public.

Funding Priorities: ERP implementation will include strategies to address the immediate needs of species and other ecosystem components at highest risk; and comprehensive measures to protect and restore habitats, rehabilitate ecological processes, and reduce stressor impacts. The initial funding allocation between these strategies is intended by CALFED to be balanced so that the total allocation provides for a comprehensive restoration approach. Adequate funding will be provided to fully support the science-based adaptive management process and the administration and management of the ERP.

Use of ERP Funds: ERP funds will be used to implement management measures identified in the Ecosystem Restoration Program Plan, non-mitigation measures identified in the MSCS, and/or measures developed under the ERP adaptive management process.

These principles will form the foundation for integrating and selecting CALFED ERP actions and other complementary actions.

Relation to Other Program Elements

There are many linkages among the objectives in the four problem areas and among the actions that might be taken to achieve these objectives. Most actions that are taken to meet program objectives, if carefully developed and implemented, will make simultaneous improvements in two, three, or even four of these problem areas.

Water use efficiency measures include conservation of water used in urban areas, in agricultural areas, and on managed wetlands, as well as water recycling. Efficiency measures can reduce water demand, thereby reducing the mismatch between supply and demand. Efficiency measures provide other benefits to the ecosystem as well. Reduction in demand may reduce the diversion of water from the Bay-Delta system which will improve streamflow and reduce the entrainment of fish. Careful application of water to gardens, lawns and farm fields can result in less runoff of herbicides, pesticides, fertilizers, and salts back into water bodies that provide drinking water sources and aquatic habitats.

The policy framework and regulatory coordination that will come from CALFED's Water Transfers Program will make an important water management tool available. A water transfer that moves water from upstream of the Delta to Delta export regions may provide ecosystem benefits by providing increased instream flows upstream of the Delta, by increasing flow into the Delta or modifying the timing of flows in ways that may benefit the ecosystem. Transfers of water between two users in Delta export areas may reduce the need to pump water from the Delta and reduce the environmental impacts of that Delta pumping. Finally, water can be transferred from diverters to instream uses, restoring beneficial timing of flows and increasing Delta outflow during critical periods. When it is necessary to meet streamflow targets above regulatory baseline flows, CALFED will pursue the acquisition of water from willing sellers. A functional water market, open to environmental buyers, will be essential to maintaining flows and habitats during critical periods.

The Environmental Water Account (EWA), described more fully later in this chapter, can be used to increase operational flexibility to help certain fish species, particularly those protected by state and federal endangered species acts, while simultaneously protecting water supply reliability and water quality. The EWA will use water purchases, storage space, and other assets to enhance upstream and in-Delta fish protection. For example, the EWA could alter the timing of water diversions from the south Delta and carry out water transfers in order to reduce entrainment and provide the migratory cues for fishes that are identified in the ERP. The EWA will use the real-time monitoring of the movement of fish in the Delta to trigger alternative water management actions at the south Delta project pumps and the Delta Cross Channel.

Through the Integrated Storage Investigation (ISI), described more fully later in this chapter, CALFED is evaluating the relationship between various types of storage within the Water Management Strategy. Surface and groundwater storage can be used to improve water supply reliability, provide water for the environment at times when it is needed most, provide flows timed to maintain water quality, and protect levees through coordinated operation with existing flood control reservoirs. In areas such as the San Joaquin River system, new storage may be an effective way to augment streamflows during periods of shortage. In the Integrated Storage Investigation, CALFED will also evaluate the modification or removal of some small dams which serve as barriers to fish migration.

The CALFED Preferred Program Alternative includes several Delta conveyance features that will protect fish, including new screens at south Delta water project intakes, an operable barrier at the head of Old River, and operations carefully guided by real-time monitoring. The Preferred Program Alternative also includes a process for determining the conditions under which any additional conveyance facilities would be needed in the future to meet ecosystem restoration objectives and fish species recovery.

Delta levee improvements reduce the risk that levees will fail during flood periods or as a result of earthquakes or gradual deterioration. This can protect not only lives and property of those who would otherwise have been flooded, but can also protect the Delta's complex habitats and critical ecological processes. In a serious levee failure, the deeply subsided islands would become embayments, channel complexity would be lost, and the rearing and foodweb function of the Delta would be significantly altered. Improvements to Delta levees can be made in ways that accommodate habitat restoration, so that levees can simultaneously protect land uses, protect water quality, and support a variety of wetland, aquatic, and riparian habitats. Waterside berms, channel islands and limited setback levees serve to bolster the integrity of the levees and to provide habitat for fish and upland plants and animals. Levee improvements in the Suisun Marsh will help protect managed wetlands and guard against adverse effects on Delta water quality from catastrophic levee failure.

CALFED actions to improve water quality focus on source control: improving the quality of water that flows through the Bay-Delta system by addressing water quality concerns at their source. In some cases this may involve cleanup of abandoned mines that leach toxic heavy metals from mine tailings. In other cases, water quality may be improved by reducing runoff and erosion on a farm or an urban landscape, improving the quality of runoff that finds its way back into streams. Many of the water quality actions are staged to provide improvements and insights critical to the successful implementation of the ecosystem restoration strategy.

Through the watershed coordination element of the Program, local watershed organizations will be better able to engage in the planning and implementation of the CALFED Program. In the lower watershed, the focus will be on ecosystem restoration and water quality actions. In the upper watersheds, the immediate focus will be on partnership projects with local entities to

improve water quality and habitat, decrease erosion, and increase base flows in the tributaries to the Delta. The coordination and outreach role of the Watershed Program will ensure cooperative and durable implementation of the ecosystem restoration strategy. Examples of watershed actions that will further the CALFED ecosystem strategy include those that improve riparian habitat along streams, increase or improve fisheries habitat and passage, restore wetlands, or restore the natural stream morphology affecting downstream flows.

An essential feature of the CALFED Program is the assurances for compliance with the State and federal Endangered Species Acts and the State Natural Community Conservation Planning Act which will derive from the Multi-Species Conservation Strategy (MSCS). The MSCS through a combination of regulation and ecosystem restoration actions will provide regulatory certainty and a framework for the acquisition of permits as the CALFED Program moves forward. The MSCS will eventually become an agreement with the agencies and user public who depend on the Delta, allowing all elements of the CALFED Program, including the ERP, to progress, by ensuring the recovery and conservation of species and habitats. The ERP will be the primary mechanism to accomplish recovery and conservation of the covered species of the MSCS. In the event that other program actions have negative effects on the ecosystem baseline, the MSCS will require mitigation measures to maintain the ecosystem at the baseline level of health.

Implementation Concerns

Agricultural Resources Many entities have expressed concerns about the effects of the CALFED Program (especially the ERP and Levee Program) on agricultural land. Agricultural resources are an important feature of the existing environment of the state and are recognized and protected under CEQA and State and federal policy. One of the major principles of the State's agricultural policy is to sustain the long-term productivity of the State's agriculture by conserving and protecting the soil, water, and air which are agriculture's basic resources. It is CALFED policy that adverse environmental effects to agricultural resources resulting from CALFED program elements, projects, and actions will be fully assessed and disclosed under CEQA and NEPA, and avoided or mitigated to the extent required by law. Assessment, disclosure, and avoidance, and other mitigation strategies will be developed at the programmatic and project-specific levels in consultation with other State, federal, and local agencies with special expertise or authority over agricultural resources which may be affected by the Program, such as the California Department of Food and Agriculture.

CALFED seeks to preserve as much agricultural land as possible during implementation in Phase III consistent with meeting all program goals. Some of the land needed for program implementation is already owned by the government and that land will be used when appropriate to achieve Program goals. Partnerships with landowners, including easements with willing land owners, will be pursued when appropriate to obtain mutual benefit if the appropriate government land is not available for the intended purpose. Acquisition of fee title to land will be from

willing sellers only, and will be used when neither available government land nor partnerships are appropriate or cost effective for the specific need.

Numerous activities and programs are ongoing or proposed that would generate a negative impact to agriculture by expanding habitat for fish and wildlife. Examples are actions being taken through the Central Valley Project Improvement Act and the Central Valley Habitat Joint Venture to protect and restore significant areas of land in the Central Valley. To the extent that these activities and programs establish habitat that helps to meet CALFED objectives, that habitat reduces the amount of habitat restoration that CALFED must carry out. Coordination of actions will help minimize impacts. Also, to the extent that these activities and programs propose water acquisition for specific watersheds that is also proposed by CALFED, that water reduces the amount of water that CALFED must acquire. Careful coordination will help ensure that all agencies' restoration programs are carried out in the most efficient way.

The *Programmatic EIS/EIR* evaluates impacts (both adverse and beneficial) of the CALFED alternatives on agricultural resources.

San Francisco Bay Several entities have expressed concern that CALFED is not directly focusing on promoting the health of San Francisco Bay, particularly the Central and South Bay areas. It is true that the Program has not included San Francisco Bay as part of its defined problem area (which includes the legally defined Delta, Suisun Bay extending to Carquinez Strait, and Suisun Marsh). Nevertheless, because the Bay-Delta system is part of a larger water and biological resource system, solutions to address the problems in the system will include a broader geographic scope extending both upstream and downstream. This solution scope includes San Pablo Bay, San Francisco Bay, and portions of the Pacific Ocean out to the Farallon Islands. In particular, the Program will address interactions between the Delta and San Francisco Bay, such as flow or sediment, by examining the "inputs" and "outputs" from the defined problem area. In addition, given CALFED's solution principle that solutions should have no significant redirected impacts, consideration needs to be given to how each alternative might negatively affect San Francisco Bay. The Programmatic EIS/EIR evaluates impacts (both adverse and beneficial) of the CALFED alternatives on the San Francisco Bay region.

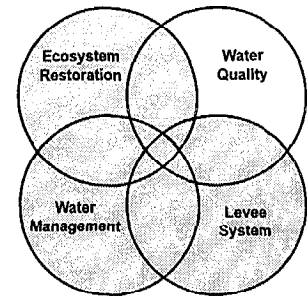
San Joaquin River Many stakeholders have recommended that CALFED give serious consideration to restoring salmon runs below Friant Dam on the San Joaquin River as a means of attaining ERP goals. CALFED will evaluate fishery restoration in the mainstem San Joaquin River as a part of the ERP, while keeping in mind the specific hydrological and water management considerations in the San Joaquin basin. CALFED is aware of the historic agreement reached between stakeholder groups in March 1999 to attempt a negotiated settlement to restore aquatic resources below Friant Dam. CALFED will monitor the progress of these negotiations, with the goal of assuring that CALFED ERP actions are consistent with and supportive of any potential settlement.

More information on the ecosystem restoration program is included in other volumes of the *Programmatic EIS/EIR*, including the *Ecosystem Restoration Program Plan*, volumes I and II, and the *Strategic Plan for Ecosystem Restoration*. Volume I contains vision statements that describe the ecological attributes and desired future Bay-Delta conditions; Volume II outlines over 600 programmatic restoration actions for the 14 ecological management zones delineated within the Bay-Delta ecosystem.

3.4 Water Quality Improvement Strategy

CALFED is committed to achieving continuous improvement in the quality of waters of the San Francisco Bay-Delta estuary with the goal of minimizing ecological, drinking water, and other water quality problems, and to maintaining that quality once achieved. This objective extends to the watersheds of the estuary to the extent that water quality problems in these watersheds affect beneficial uses dependent on the estuary.

“Continuous” as used here means a steady or step-wise trend over the 30-year time horizon of the CALFED Program, and does not include short-term fluctuations that may be brought about by wet or dry hydrologic conditions, other shorter term, temporary, events or time needed to initiate and implement improvement measures. Although specific water quality targets have been established to gauge the success of the Water Quality Improvement Strategy, CALFED will seek to achieve water quality that exceeds these targets where feasible and cost effective. At the same time, it is anticipated that periodic re-evaluation of water quality targets will be a feature of adaptive management within this strategy.



Success in achieving the CALFED water quality objective will depend upon close coordination and collaboration among CALFED, responsible State and Federal agencies, and local agencies and interests. The CALFED Program will emphasize voluntary, cooperative, incentive-based efforts to improve water quality, but CALFED will work with regulatory agencies to assure program goals are accomplished where voluntary efforts prove insufficient. For example, some of the problems identified in this strategy will be subject to a Total Maximum Daily Load (TMDL) process pursuant to the Clean Water Act. CALFED is providing a forum with regulatory agencies and stakeholders to ensure that the TMDL and CALFED efforts are closely coordinated and complementary.

CALFED's primary water quality improvement strategies are for environmental water quality and drinking water quality. They are similar in their fundamental approaches, but are different enough to merit separate description.

Environmental Water Quality Improvement Strategy

CALFED's environmental water quality goal is to provide water in the Bay-Delta system that is of sufficient quality to protect all ecological beneficial uses of the water. For many water quality parameters, numerical and/or narrative objectives exist in water quality control plans adopted by the SWRCB and Regional Water Quality Control Boards. CALFED will use these objectives where appropriate as its targets for water quality improvement.

Water quality improvement is a key element of the ecosystem restoration strategy. Several water quality components have been found in the Delta at levels that could cause chronic or acute toxicity to aquatic and terrestrial organisms. Toxicity testing in the Delta and the two main tributaries, the San Joaquin River and the Sacramento River, have shown that Bay-Delta water is frequently toxic to some test species. Additionally, State and federal agencies are required to compile a list of those waters that do not meet a standard of water quality that is protective of the beneficial uses of that water body. That list was used to develop a portion of the scope of the Water Quality Program.

CALFED has identified several constituents of concern for which individual actions and studies have been proposed. Similar to the drinking water quality improvement strategy (discussed below), the individual strategies for the environmental constituents of concern contain actions such as source reduction and mine remediation. The studies proposed include source identification, interaction with the environment, and bioavailability. Each strategy is composed of a combination of actions and studies that will be developed and performed under the scrutiny of a public advisory group. Both the studies and actions must be conducted with continuous monitoring and assessment.

The major areas that have been identified for action and the basic programmatic actions are:

- **Low Dissolved Oxygen and Oxygen-Depleting Substances (in the lower San Joaquin River, South Delta, and elsewhere)** - Reduce impairment of rivers and the estuary caused by substances that exert excessive demand on dissolved oxygen. Oxygen depleting substances are found in waste discharges, agricultural discharges, urban storm water, feedlot discharges, sediment, and algae.
- **Mercury (the Sacramento River, Cache Creek, the Delta, and the Bay)** - Reduce mercury in rivers and the estuary by source control at inactive and abandoned mine sites. Determine current mercury levels in water, sediment and fish in the estuary, rivers and affected tributaries. Implement comprehensive monitoring and research program to determine loadings and sources of total and methyl mercury, transport of mercury in sediment, factors affecting mercury transformation and bioaccumulation in the estuary, and concentrations of mercury

in indicator species. Use this information to prioritize remediation or cleanup of mercury sources.

- **Pesticides (from urban and agricultural uses of current pesticides)** - Reduce impacts of pesticides (including diazinon and chlorpyrifos) through development and implementation of Best Management Practices, for both urban and agricultural uses, and support of pesticide studies for regulatory agencies while providing education and assistance in implementation of control strategies for the regulated and unregulated pesticide users.
- **Organochlorine compounds (compounds like DDT and PCBs)** - Reduce the load of organochlorine compounds in the system, including residual DDT and chlordane, by reducing runoff and erosion from agricultural lands through Best Management Practices. Sediment control will also protect valuable topsoil and prevent costly maintenance of drainage systems.
- **Salinity (concentrated mostly in the San Joaquin Valley)** - Actions are planned to reduce salt loads in agricultural drainage and in urban and industrial waste water to protect drinking and agricultural water supplies, and to facilitate development of successful water recycling, source water blending, and groundwater storage programs. For the San Joaquin River watershed, a strategy will be developed using a continuous monitoring technology to minimize water quality impacts of salt movement through the system. This strategy will be consistent with CVPIA and Vernalis Adaptive Management Plan (VAMP) requirements. CALFED will not pursue resolution of salinity problems of the San Joaquin Valley through a San Joaquin Valley Drain, which is beyond the scope of the CALFED Program. Long term solutions will be sought through the San Joaquin Valley Drainage Implementation Program, with CALFED support. Salinity in the Delta will be controlled both by limiting salt loadings from its tributaries, and through managing seawater intrusion by such means as using storage capability to maintain Delta outflow and to adjust timing of outflow, and by export management.
- **Selenium (a naturally occurring salt in the San Joaquin Valley that gets concentrated in agricultural drainage, and a component of Suisun and San Pablo Bay petroleum refinery discharges)** - Reduce selenium impacts through reduction of loads at their sources, and through appropriate land fallowing and land retirement programs (including those under the CVPIA). In the San Joaquin River watershed, reduced loads will be accomplished through implementation of on-farm and district source control measures, development of treatment technology, implementation of projects such as the Grasslands Bypass Use Agreement (if shown effective), and appropriate land fallowing and land

retirement. Increased assimilative flows are anticipated as a result of Federal Energy Regulatory Commission actions on San Joaquin River tributaries and VAMP flows. Selenium impacts from refinery sources in Suisun Bay will be reduced by improved source control.

- **Trace Metals (from mines, agriculture, and urban areas)** - Reduce impacts of trace metals such as copper, cadmium, and zinc in upper watershed areas, near abandoned mine sites. Reduce impacts of copper through urban storm water programs and agricultural Best Management Practices. Study the ecological impacts of copper in the Delta, and determine the feasibility of copper load reduction.
- **Turbidity and Sedimentation (predominantly in the upper watershed)** - Reduce turbidity and sedimentation which affect several hydraulic areas in the Bay-Delta and its tributaries. Study ecological impacts of sedimentation. Control sedimentation in several watersheds to protect spawning beds and maintain capacity of streams.
- **Toxicity of Unknown Origin (predominantly in the Delta)** - Through research and monitoring, identify parameters of concern in the water and sediment within the Delta, Bay, Sacramento River and San Joaquin River regions and implement actions to reduce their toxicity to aquatic organisms.

Drinking Water Quality Improvement Strategy

Drinking water supplies from the Delta contain higher bromide concentrations than are found in the drinking water supplies of about 90% of the nation. Bromide reacts with disinfection chemicals to form byproducts that have increasingly raised health concerns for consumers. Most of this bromide comes from the ocean as a result of its connection with the Bay-Delta estuary. Additional pollutants of concern for drinking water include organic carbon, which also has disinfection byproduct ramifications, and pathogens.

The CALFED drinking water quality objective is to continuously improve water quality that allows for municipal water suppliers to deliver safe, reliable, and affordable drinking water that meets, and where feasible, exceeds applicable drinking water standards. The CALFED strategy for improving drinking water quality is to reduce the loads and/or impacts of bromide, total organic carbon, pathogens, nutrients, salinity, and turbidity through a combination of measures including source reduction, alternative sources of water, treatment, and storage and conveyance improvements.

CALFED's specific target for providing safe, reliable, and affordable drinking water in a cost effective way is to achieve either: (a) average concentrations at Clifton Court Forebay and other south and central Delta drinking water intakes of 50 ug/L bromide and 3.0 mg/L total organic carbon; or (b) an equivalent level of public health protection using a cost effective combination of alternative source waters, source control, and treatment technologies. CALFED has not adopted a specific numeric target for salinity (other than meeting existing Delta standards) but does have a preliminary objective of reducing the salinity of Delta supplies. Such reduction will increase the capability for blending of supplies from Delta and non-Delta sources, increase opportunities for recycling and conjunctive use, and reduce the need for additional treatment of industrial process water.

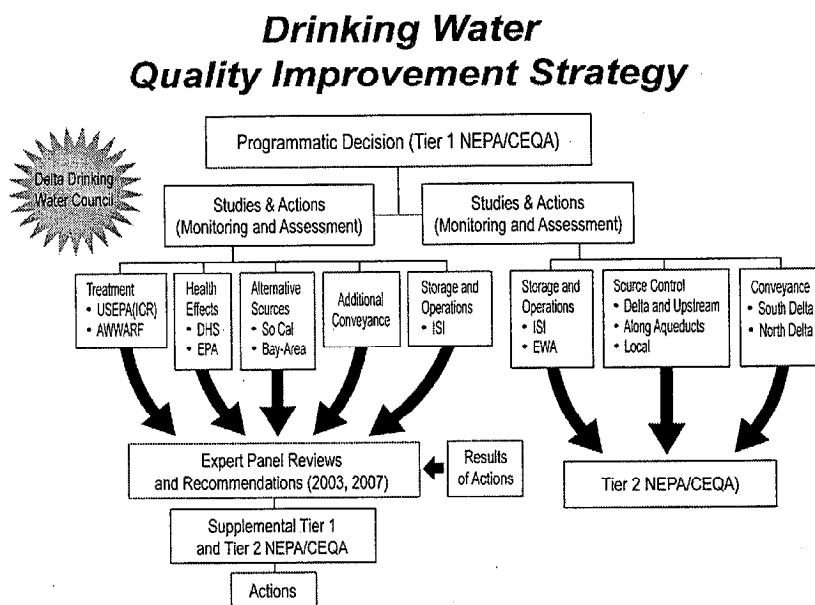
The adjacent figure lays out the drinking water quality improvement strategy to achieve this target. The strategy is composed of a combination of actions and studies developed and performed under the scrutiny of a public advisory group (the Delta Drinking Water Council, comprised of urban water agency, environmental group, business, Delta, and public health agency representatives).

Interim milestones will be developed to help measure progress toward CALFED's public health protection objectives. The information generated by these actions and studies will serve as the basis of reviews by panels of independent experts in 2003 and 2007. These panels will be convened to assess the results of drinking water studies, to assess the continued

appropriateness of the water quality targets, and to make recommendations on future actions to improve drinking water quality. The results of the expert panel reviews will be published and will assist CALFED and the State legislature in determining which additional measures or set of measures are most appropriate to meet CALFED's public health protection objectives.

Both the water quality studies and actions to be implemented in Stage 1 must be conducted with continuous monitoring and assessment. The actions and studies to be performed as components of the strategy are described below:

- **Source Control** - CALFED will implement source controls in the Delta and its tributaries. CALFED, with CalEPA (State Water Resources Control Board and



the Central Valley Regional Water Quality Control Board, the Department of Health Services, and the Department of Water Resources, with assistance from the US EPA) will coordinate a comprehensive source water protection program. This program will include identification and implementation of appropriate pollutant source control measures, focused incentive programs targeting priority pollutants, development of monitoring and assessment programs, and infrastructure improvements to separate drinking water intakes from irremediable sources of pollutants. This source control program could also include projects and programs such as TOC/DOC studies/projects, Veale/Byron Tract drainage management, industrial source control measures, advanced wastewater treatment improvements, local salt removal, watershed improvements to reduce constituents of concern in the Sacramento and San Joaquin Rivers, recreational impacts on drinking water quality in the Delta and reservoirs, drainage problems in the San Joaquin Valley, and monitoring, research, and modeling.

Water that is conveyed to municipal water agencies via open aqueducts such as the California Aqueduct, the South Bay Aqueduct, and the Delta-Mendota Canal needs to be protected from degradation in those conveyance facilities by controlling sources of pollution along the aqueducts. Source control is also necessary in the watersheds that drain to local reservoirs that receive water exported from the Delta or are blended with export waters to insure that high quality is maintained. CALFED will implement appropriate physical modifications and watershed management programs to control runoff into the California Aqueduct and other similar conveyances.

- **Alternative Sources** - For both Southern California and the San Francisco Bay Area, opportunities exist to engage in water exchanges with agricultural water users and among urban users to shift higher quality supplies to urban users for drinking water while ensuring that agricultural users retain a reliable supply of water. The development of these opportunities depends heavily on the cooperation of urban users in the two identified regions with each other and with agricultural users in the San Joaquin Valley. Enabling Delta water users to substitute higher quality source water for current Delta water offers important opportunities to improve drinking water supplies. At the same time, however, CALFED will continue its commitment to assure continuous improvement in the quality of Delta water for all uses.

Specifically, CALFED will work cooperatively with Bay Area water suppliers as they develop a Blending/Exchange project which enables them to work cooperatively to address water quality and supply reliability concerns. In addition, CALFED will facilitate water quality exchanges and similar programs to

make high quality Sierra water in the eastern San Joaquin Valley available to urban Southern California interests.

- **Health Effects** - CALFED will work with the California Department of Health Services and EPA to ensure that there is adequate ongoing research on the health effects of drinking water, in particular brominated compounds that are prevalent in drinking water that comes from the Delta.
- **Treatment** - CALFED will evaluate alternative approaches to drinking water treatment to address growing concerns over disinfection byproducts, pathogens and salinity. Recent private sector efforts have generated substantial advances in treatment technologies. CALFED will encourage these technologies by funding a demonstration UV disinfection plant as well as funding other demonstration projects to design and operate desalination facilities for agricultural drainage using membrane treatment technology and focusing on management of brines and on-site waste stream management, and other promising treatment technologies that arise during the Program.

EPA is engaged nationally in collecting information from water utilities regarding the effectiveness of source control and treatment. This effort is known as the Information Collection Rule. It will provide a basis for considering improvements to existing drinking water treatment technology. The American Water Works Association Research Foundation (AWWARF) is engaged in ongoing research regarding methods to improve drinking water quality. CALFED will work with water utilities to ensure that EPA's and AWWARF's efforts continue to be useful to water suppliers dependent on Delta supplies.

- **Storage and Operations** - CALFED is considering flexible management of water operations (including operation of the Delta Cross Channel) that may achieve fish protection and ecosystem benefits more efficiently than a completely prescriptive regulatory approach. These management operations may have ancillary benefits for source water quality. In addition, CALFED agencies are conducting an Integrated Storage Investigation to evaluate the relationship between various types and locations of storage and the overall role of storage in water quality improvement as part of the CALFED Water Management Strategy.
- **Conveyance Improvements** - CALFED has proposed a broad array of actions for the lower San Joaquin River and south Delta region to address ecosystem, water quality, and water supply availability concerns, including operable barriers in strategic locations to maintain adequate water quality and stages to facilitate local water supply availability. In addition, in the north Delta, CALFED has proposed study and evaluation of a screened diversion structure on the Sacramento River.

Appropriate studies of how additional conveyance improvements, including but not limited to an isolated facility, can be developed and operated need to continue so that CALFED can pursue these conveyance improvement options in a timely manner should it prove necessary to do so.

Relation to Other Program Elements

CALFED's strategy is founded on reducing or eliminating parameters that degrade water quality at their sources. However, other components of the CALFED Program can affect water quality. Watershed activities can improve water quality in the Bay-Delta system by helping to identify and control non-point sources of pollution and identify and implement methods to control or treat contaminants in the watersheds flowing to the Bay-Delta. CALFED has developed a Watershed Program that has strong linkages to both the water quality improvement strategy and the ecosystem restoration strategy.

The two main components of the Watershed Program are to provide assistance - both financial and technical - to local watershed programs, and to promote collaboration and integration among local watershed programs and the CALFED Program. CALFED supports and encourages locally-led watershed activities that benefit the Bay-Delta system. Emphasis is placed on local leadership, recognizing that local watershed approaches may vary and that community involvement and support are essential. CALFED strives to strengthen the partnerships and relationships between the public, local watershed organizations, and governments at all levels. Watershed activities included in the Watershed Program should ensure that adaptive management processes can be applied at multiple scales and across ownerships.

In summary, the Watershed Program Plan includes the following elements:

- **Support Local Watershed Activities** - Implement watershed restoration, maintenance, and conservation activities that support the goals and objectives of CALFED.
- **Coordination and Assistance** - Facilitate and improve coordination and assistance between government agencies, other organizations, and local watershed groups.
- **Watershed Monitoring Assessment** - Facilitate monitoring efforts that are consistent with the CALFED Science Program's protocols and support watershed activities that ensure adaptive management processes can be applied.
- **Education and Outreach** - Support resource conservation education at the local watershed level and provide baseline support to watershed programs.

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- **Watershed Processes and Relationships** - Identify the watershed functions and processes that are relevant to the CALFED goals and objectives, and provide examples of watershed management activities that could improve these functions and processes.

Surface and groundwater storage along with Delta conveyance improvements can help in the management of inflows to and exports from the Delta. These improvements could be used to improve drinking water quality as well as to provide additional ecosystem protection and enhance water supply reliability. Adaptive management principles will be used to balance operations to meet these objectives. A cooperative study led by CALFED and several urban stakeholders was recently initiated to explore the potential for water quality improvements through management of water project operations. As a starting place, the group considered the potential for water quality improvements using the system flexibility provided by the Delta conveyance improvements expected during Stage 1 of implementation of the CALFED Program. Several potential measures were identified, including increasing Delta outflow in the fall, alteration of export pumping patterns to avoid elevated levels of salinity and TOC, and methods of separating relatively high and low quality supplies during conveyance after export from the Delta. Preliminary results indicate that reductions in salinity of 10 to 20 percent are possible. However, these water quality improvements are possible only when dedicating system flexibility to this objective; when the water projects are operated in this manner, water supply reliability benefits of the Delta conveyance improvements are reduced. The ISI will include more refinement and analysis of operational concepts for water quality improvement.

Water use efficiency measures can improve water quality entering the Delta by reducing some agricultural and non-agricultural discharges containing pollutants. Ecosystem restoration actions may degrade drinking water quality by increasing organic carbon loads; therefore these actions will need to be structured so as to minimize adverse water quality impacts while meeting the objectives of the ERP.

Water quality can affect the ability to expand water use efficiency measures such as conservation, water recycling, and conjunctive use, all of which depend on the availability of high quality water to prevent salt damage of irrigated land or groundwater basins, prevent corrosion of industrial equipment, and to achieve blended water salinity objectives.

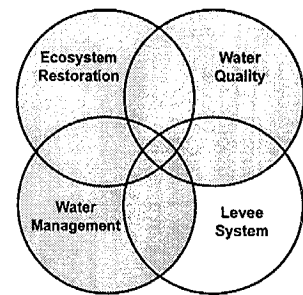
In the event of a catastrophic levee failure in the Delta, the amount of saline water entering the system could make Delta waters unusable for many months. Besides making the water unusable for agricultural, industrial, or domestic purposes, it could also have a detrimental effect on habitat quality. Therefore, it is difficult to overestimate the importance of a successful Delta levee program to achieving and maintaining good water quality for the beneficial uses of Delta waters.

The CALFED Science Program will be the primary vehicle for measuring the extent to which continuous water quality improvement is achieved. Performance will be measured by comparing ambient water quality (where appropriate) to specific water quality objectives that have been established for the parameters of concern.

More information on CALFED's Water Quality Program is included in another appendix to the *Programmatic EIS/EIR*, the *Water Quality Program Plan*.

3.5 Levee System Improvement Strategy

Delta levees and islands are the most visible anthropogenic features of the Delta. Levees are an integral part of the Delta landscape and are key to preserving the Delta's physical characteristics and processes including definition of the Delta waterways and islands. Levees also protect Delta land uses including agriculture, as well as terrestrial habitat in the Delta. Given the numerous public benefits protected by Delta levees, the focus of the CALFED strategy is to improve levee integrity. The principal program element to accomplish this will be the Long-Term Levee Protection Plan. It describes actions that will result in subsidence reduction, management, and reversal, which helps long-term Delta system integrity; increased reliability for water supply needs from the Delta and in-Delta water quality; increased reliability for in-Delta land use; and increased reliability for in-Delta aquatic and wildlife habitat.



The levee plan will build on the successes of existing programs in achieving its goals. There are five main parts to the levee plan:

- **Base-Level Protection Plan** - Base-level funding will provide equitably distributed funding to participating local agencies in the Delta. One of the primary goals of the CALFED Program is to reconstruct all Delta levees to a particular standard. CALFED has tentatively selected the U.S. Army Corps of Engineers PL 84-99 standard. Base level funding will provide for reconstruction and maintenance of Delta levees to the PL 84-99 standard. Required levee work may include removal of vegetation and debris, maintenance of water control devices, repair or replacement of existing bank protection, addition of material to achieve required cross section, removal of flood deposits, extermination of burrowing rodents and crustaceans (mitten crab), repairing and shaping access roads, repairing slipouts and erosion damage, dredging as required for minor repairs, controlling vegetation on the waterside of the levee, and other actions necessary to maintain levee integrity and appurtenances. This component will be coordinated with the Delta Levee Subventions Program currently administered by DWR.

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- **Special Improvement Projects** - The special improvement project funding continues a funding mechanism for special habitat improvement and levee stabilization projects to augment the base-level funding, within specific policy guidelines. Under the special improvement projects, flood protection would be enhanced for key islands that provide statewide benefits to the ecosystem, water supply, water quality, economy, and the infrastructure. Special improvement project funding is based on the benefit to the public, not solely on the need for improvement. This component will be coordinated with and build on the successes of the Special Flood Control Protections Program which is currently administered by DWR.
 - **Delta Island Subsidence Control Plan** - Numerous factors including oxidation, compaction and erosion of peat soils have caused some Delta islands to subside several feet below sea level. Today, these islands, and the environmental and water resources dependent upon them, are protected from seawater inundation by a network of Delta levees. The Levee Program will implement current BMPs to control subsidence on levees and coordinate research to quantify the effects and extent of inner-island subsidence as it relates to all CALFED objectives. Subsidence control measures will be implemented through the base-level protection component of the Levee Program and supplemented by research grants to develop BMPs through the CALFED Science Program. If cost effective and feasible, interior island subsidence and control measures will be recommended by CALFED during Stage 1.
 - **Emergency Management Plan** - The most recognizable threat to Delta islands and resources in the Delta is inundation due to winter flood events. In addition, other potential disasters can be caused by high tides and high winds, earthquakes, burrowing animals whose actions can cause levees to fail, toxic spills, failure of Delta levees during low flow periods, and fire. Approximately 20 islands have flooded since the 1960s, including repeated flooding of some islands. The emergency management plan will build upon existing State, federal, and local agency emergency management programs to improve protection of Delta resources in the event of a disaster.
 - **Delta Levee Risk Assessment and Risk Management Strategy** - Delta levees and islands are at risk of failure from floods, seepage, subsidence, earthquakes, and other threats. The Levee Program will quantify the risks to Delta levees, evaluate the consequences, and develop an appropriate risk management strategy. See the following text box for more information.

Additionally, CALFED is including the Suisun Marsh levee system in the Levee Program and is considering the following two options for marsh levees:

1. Include all the exterior Suisun Marsh levees (approximately 230 miles) into CALFED's Levee Program. The existing "Suisun Marsh Exterior Levee Standard" would be adopted.
2. Protect part of the levee system. Reconfigure the Marsh to protect existing managed wetlands and develop new tidal wetlands.

Identifying and Managing the Risks to Delta Levees

Delta levees and islands are at risk of failure from earthquakes, floods, subsidence, seepage and other threats. The Levee Program is taking steps to identify the risks to Delta levees and present a suite of options to manage this risk.

Over the past 25 years, the existing Delta levee program has reduced the flood and seepage risk by improving Delta levees. Research and demonstration projects are being conducted to quantify the effects of subsidence and determine how to reduce its threat to Delta levees.

Over the past year, a seismic risk assessment was made by a group of experts in the fields of seismology and geotechnical engineering. The results of this investigation are listed in Appendix G of the Levee System Integrity Program Plan.

In an effort to further quantify the risks to levee dependent systems, CALFED will augment this group based on stakeholder recommendations, and charge them with the following tasks:

1. Design and perform a risk assessment. Identify contributors to levee risk and quantify the risk to levee dependent systems.
2. Provide recommendations for seismic upgrades to critical Delta levees and other measures to reduce levee failures. Include an evaluation of the reduction in levee vulnerability and cost estimates, (\$/mile), for various recommendations.
3. Review the Subsidence Subteam's report and comment on the concept of a zone of influence and the influence of inner island subsidence on levee integrity.
4. As a component of CALFED's Science Program, review the Levee Program's scope, particularly the recommendations for subsidence, emergency response, and seismic risk assessment. Comment on the proposed scopes and develop cost estimates for completing the monitoring, assessment and research.

Once the risk to Delta levees and the systems dependent on them is quantified and the consequences evaluated, CALFED will implement an appropriate risk management strategy.

Several risk management options have been developed for inclusion in the CALFED Preferred Program Alternative. The available risk management options include but aren't limited to:

- Improving emergency response capabilities
- Developing storage south of the Delta
- Reducing the fragility of the levees
- Improving through-Delta conveyance
- Releasing more water stored north of the Delta
- Restoration of tidal wetlands
- Controlling and reversing island subsidence
- Curtailing Delta diversions
- Continued monitoring and analysis of total risk
- Constructing an isolated facility

The final Risk Management Plan may include a combination of these options and others identified as a result of the risk assessment.

Relation to other Program Elements

The CALFED levee system improvement strategy relies principally on the Long-Term Levee Protection Plan. The most important program linkages are with ecosystem restoration, storage, and conveyance.

CALFED seeks to reduce the conflict between protection of wildlife habitat that occurs on levees and maintenance of the levees to prevent their failure, and is working to minimize potential conflicts and identify key areas where ecosystem restoration actions and levee maintenance actions can be coordinated. Another area of overlap between the Levee Program and the Ecosystem Restoration Program concerns efforts to reduce or reverse subsidence and actions to restore habitat. Both the Delta ecosystem and levee system stability can benefit from reducing land surface subsidence adjacent to levees. The creation of shallow-wetland habitat serves to reduce or reverse subsidence.

An area of common concern for levee and channel maintenance and water quality protection is toxicity of sediments and water quality impacts from dredging. Research to resolve dredge permitting issues will provide useful information for protecting water quality. Dredge permits will be required in order to use dredged materials to create shallow-water habitat. Thus, efforts to resolve dredge permitting issues related to levee and channel maintenance also will benefit the ecosystem restoration. Also, the success of the South Delta modifications is dependent on being able to dredge in a timely and effective manner.

Reservoir storage and levees function as a system with regard to flood control. CALFED proposals for setback levees are included in the Ecosystem Restoration and Conveyance actions. These actions may improve levee system integrity.

Watershed management actions may reduce the risk of levee failures by moving the timing, variability, and duration of floodplain inundation and water table elevation closer to an undisturbed condition through meadow restoration and wetland development.

Two major Corps studies will provide significant inputs to the implementation of the Long-Term Levee Protection Plan. The Sacramento -- San Joaquin Delta Special Study may provide project specific recommendations which Congress could authorize for implementation of the Delta levees. The Sacramento and San Joaquin River Basins Comprehensive Study is developing a system-wide flood management plan for the Central Valley to reduce flood damage and integrate ecosystem restoration. Other related Corps studies include project specific investigations on the Lower Sacramento River, the Cosumnes and Mokelumne Rivers, the San Joaquin and Tributaries, and the Western Delta Islands.

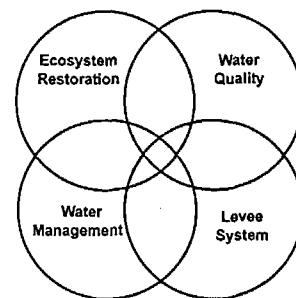
More information on the levee program is included in another appendix to the *Programmatic EIS/EIR*, the *Long-Term Levee Protection Plan*.

3.6 Water Management Strategy

3.6.1 Developing a Water Management Strategy

CALFED's fourth broad, comprehensive strategy is the Water Management Strategy. The Water Management Strategy has three broad purposes:

- Develop a menu of water management tools that can be used to attain CALFED's water supply reliability goals.
- Identify specific water management tools from this menu which will be implemented in Stage 1 of the CALFED Bay-Delta Program.
- Provide a long-term decision making framework for evaluating the success of implementation efforts and for selecting additional tools needed to achieve CALFED's objectives.



Chapter 2 of this report highlighted the substantial variability of California's hydrological cycles and water demands from agricultural, urban, and environmental uses. To respond to this variability, and in light of the substantial need to improve water management in California, CALFED must integrate all available tools in the Water Management Strategy.

Defining Water Supply Reliability Objectives

CALFED's broad objective for water supply reliability is to "Reduce the mismatch between Bay-Delta water supplies and current and projected beneficial uses dependent on the Bay-Delta system." CALFED has amplified this objective by developing a three-part strategy to improve water supply reliability. To guide the implementation of this multi-part strategy, CALFED has identified three primary goals. These goals are as follows:

- **Goal A:** Increase the utility of available water supplies (making water suitable for more uses and reuses).
- **Goal B:** Improve access to existing or new water supplies, in an economically efficient manner, for environmental, urban and agricultural beneficial uses.
- **Goal C:** Improve flexibility of managing water supply and demand in order to reduce conflicts between beneficial uses, improve access to water supplies, and decrease system vulnerability.

Evaluating Water Management Tools

The menu of tools that will be used to achieve the goals and objectives of the Water Management Strategy encompasses many of the CALFED program elements. The primary tools include:

- Water Use Efficiency Program (agricultural, urban, and wetland water conservation and water recycling)
- Water Transfer Program
- Conveyance, including South Delta Improvements
- Storage
- Operational strategies, such as real-time diversion management

Each of these primary tools is discussed in detail below. In addition to these primary tools, the Water Management Strategy will rely on additional CALFED Program tools to provide additional benefits. These include the Watershed Program, Water Quality Program, and real-time monitoring through the Science Program.

In evaluating and developing an initial set of water management tools, CALFED considered the relative ability of the tools individually and in combinations to satisfy the CALFED solution principles. Some examples of these considerations are:

Affordability The cost of tools differ substantially. One important measure of cost is the estimated cost per acre-foot of water supply. Some estimates of this cost measure have been generated by CALFED in an economic evaluation of water management alternatives.

Although cost per acre-foot is an important cost measure, other cost factors must also be assessed. For example, the cost of water will further increase depending on improvements required to meet water quality objectives (salinity, mercury, etc.). Depending on the water source, the costs for source control measures and treatment measures will vary. These cost differences are important in decisions regarding levels of investment in watershed actions and treatment actions to attain water quality goals. Finally, there are also significant regional differences with respect to the suitability and cost of tools.

Reducing Conflicts in the System Increased flexibility is essential to reducing conflicts in the system. The various water management tools offer different levels of adaptability to varying hydrologic conditions and management objectives. For example, many water conservation measures have substantial benefits in reducing overall demand, but, once implemented, do not provide flexibility to react to changes in hydrological circumstances. Surface storage facilities

are very effective at providing a rapid reaction in either releasing or collecting large amounts of flow. In contrast, although groundwater storage may hold more volume, it is slower to fill and extract, and would have to be operated in conjunction with surface storage to attain the same level of flexibility. Thus, it is important to consider the system flexibility improvements provided by combinations of tools as well as individual tools.

Have No Significant Redirected Impacts Water management tools differ in their potential effects on environmental resources. Generally, water conservation measures are viewed as more environmentally benign, given that they may reduce demand, increase flows in certain reaches of rivers, and improve water quality. Nevertheless, even water conservation measures may have adverse environmental effects. For example, substantially increasing farm or landscape irrigation efficiency may reduce water runoff that currently sustains aquatic or aquatic-dependent ecosystems or reduce groundwater recharge.

Water storage facilities also differ in their potential effects on environmental resources. Generally, groundwater projects have more benign on-site environmental and land use impacts than surface storage. Off-stream surface storage projects generally have less environmental impacts than new on-stream projects. However, all surface and groundwater storage projects create some environmental impacts.

Economic Evaluation of Water Management Alternatives

A critical analysis in CALFED's Water Management Strategy is the Economic Evaluation of Water Management Alternatives (EEWMA). The EEWMA provides important economic information that can help define potential opportunities for implementing water management tools. As an initial effort, a broad programmatic assessment was conducted to provide guidance on the initial mix of tools to be included in the Water Management Strategy.

The initial, programmatic evaluation shows how water demands shift with the cost of water, and arrays supply options by costs and by yield for each of five regions within the CALFED solution area. The "supply options" are urban and agricultural water use efficiency, urban recycling, active conjunctive use, new surface storage, and voluntary water transfers made possible through water conservation or agricultural land fallowing. For the programmatic evaluation, estimates were made of the general quantities of water available (yield) at various unit prices for the different supply options. Recognizing that policies, regulations, or other decisions can change the cost, yield, and availability of each water supply tool, the evaluation develops supply and demand scenarios which reflect varying constraint sets suggested by stakeholders. The analysis then displays consequences of these preference-based scenarios for availability and cost of water supplies throughout the system. This approach shows stakeholders and agencies how limiting or emphasizing certain supply options can change the overall cost and feasibility of achieving improvements in water supply availability. Although the analysis includes some costs reflecting differences in water quality for drinking water sources, the EEWMA does not seek to incorporate the full environmental or socioeconomic consequences of various supply options.

The EEWMA provides information on the relative effectiveness of the water management tools, but does not present the complete answer. The economic information must be supplemented by other descriptions of the opportunities, limitations, and interrelations of the tools for example, overall operational flexibility and socioeconomic and environmental impacts. One general finding from this work is that all types of water management tools evaluated (e.g. water use efficiency measures, water transfers, and storage) could play a role in meeting CALFED's water supply reliability goals. More detailed economic evaluations will continue in Stage 1 and be included in site-specific studies.

Interrelationships, Opportunities, and Limitations of Tools

As discussed above, no single water management tool or CALFED program element can adequately address all the needs for improving water supply reliability. CALFED's Water Management Strategy employs a combination of water management tools to meet the Program's water supply reliability goals and objectives. Later in this chapter, CALFED's evaluation of the potential and status of each primary water management tool is discussed in detail. First, however, the following discussion will highlight the interrelationships and potential strengths or weaknesses of the various water management tools.

Water Transfers The term "water transfers" generally means the redirection of water initially acquired pursuant to a water right, a contract, or by groundwater extraction from one user to another on a voluntary and compensated basis. CALFED's Water Transfer Program proposes a framework of actions, policies, and processes that, collectively, will facilitate water transfers and further development of a state-wide water transfer market. Because water transfers can affect third parties (those not directly involved in the transaction) and local groundwater, environmental, or other resource conditions, the framework also includes mechanisms to provide protection from such impacts.

Transfers are closely linked with other water management tools. For example, water saved by implementing water use efficiency measures is potentially available for transfer to another use. Similarly, new storage or conveyance improvements could provide access to additional water available for transfer, and can facilitate additional transfers between users. Water transfers also have the potential for affecting water quality conditions, either positively or negatively, if the transfer changes the timing of a water use or instream flow.

CALFED envisions that voluntary, compensated long-term and short-term water transfers will be the primary source of the water needed under the Ecosystem Restoration Program for restoring critical instream flows and improving Delta outflow during key springtime periods. Also, to function adequately, the Environmental Water Account will require the capability to purchase and transfer water for modifying export pumping, instream flows and Delta flow patterns.

Agricultural Water Conservation Improved agricultural water conservation can result from management and technical improvements at both the irrigation district and farm level. The

potential benefits of conservation include reductions in diversions, reductions in percolation to salt sinks, reductions in evapotranspiration, and/or reductions in contaminated runoff.

As a water management tool, agricultural water conservation can assist in meeting CALFED's water utility and water access goals. Reductions in pollutant discharges can increase the utility of the water for subsequent uses. Water made available through conservation measures can be used to firm up water supply reliability on the farm or potentially can be made available to other users through water transfers or reduced diversions.

Urban Water Conservation Urban water conservation also helps meet CALFED's water utility and water access goals. Most major California urban areas discharge wastewater into the Pacific Ocean. In these areas, urban water conservation will directly reduce per capita water use and may reduce total urban demand for water. While making better use of urban water supplies is an important component of CALFED's Water Management Strategy, urban water conservation can have a negative effect on system flexibility. As more water conservation measures are implemented as part of the normal water use pattern, additional conservation will be more difficult to achieve, more costly, or behavioral changes will be required of users to conserve more water to respond to shortages.

Managed Wetlands Water Conservation Managed wetlands are those wetland areas controlled by private owners or public agencies that rely on delivered water for some or all of their water supplies. Managed wetlands water conservation can help meet CALFED's water utility and water access goals.

Water Recycling Water recycling can help attain CALFED's water utility and water access goals. Water recycling involves reusing water that is not consumptively used during a previous application. Recycled water can be used to recharge groundwater, with a level of treatment, or can be used as a substitute supply with a lesser level of treatment in areas where high quality is not needed (e.g. golf courses). Urban areas have a very high potential for reuse, on the order of 1-2 MAF/year, though the cost can be quite high. However, it is a very reliable source of water and can have among the least environmental impacts of any of the water management tools.

Other CALFED water management tools have a direct effect on the success of water recycling programs. The ability to recycle water is highly dependent on the total dissolved solids (TDS) in the water. Each use of water adds salts to the water, so lower TDS source water provides more opportunities for recycling or blending with other sources than source water higher in TDS. Water quality control measures, operational changes, and improvements in storage and conveyance can all increase the recycling potential.

Storage Surface and groundwater storage can make major contributions to each of the water supply reliability goals, but is especially helpful in improving overall system flexibility. As a water management tool, storage also has some negative aspects, including its cost and adverse environmental impacts of site development and of water diversion to storage.

Groundwater and Conjunctive Use - Groundwater storage is usually the least expensive type of storage, can be implemented most rapidly, and results in the least environmental impacts. However, groundwater storage is less flexible than surface storage. Fill rates are constrained by the size of distribution systems and by the rate at which water can be introduced into the ground or recharged in-lieu. Extraction rates are limited by the rate at which water can be pumped from the ground. In addition, groundwater storage projects frequently generate concerns about effects on nearby groundwater quantity and quality. Under many groundwater conjunctive use operations, surface water is used more in wetter years allowing underlying groundwater aquifers to recharge naturally, and from percolation from applied water. During dry years, water is pumped from storage to meet consumptive uses, allowing less reliance on surface water supplies.

Surface Storage - Surface storage is generally more flexible than groundwater storage, depending on operating criteria. Water in surface storage can be quickly stored and quickly released when needed, although offstream surface storage fill and release rates can be quite constrained. The environmental impacts (both on-site and from diversion) and relatively significant costs of new surface storage are the main disadvantages.

Hydropower Reoperation - AB 1890 (Chapter 854, Statutes of 1996, Public Utilities: electrical restructuring) has triggered an evaluation and potential divestiture of some or all of the existing facilities in the Bay-Delta system dedicated to the generation of hydroelectric power. There is potential to re-operate some of these hydroelectric facilities to produce water supply or ecosystem benefits. CALFED conducted an initial evaluation of the potential for re-operation of existing hydroelectric facilities and concluded that there is limited potential for re-operation to meet CALFED water management objectives, but there may be more potential to meet local water management objectives or ecosystem restoration objectives.

Conveyance Improved conveyance can potentially contribute to each of CALFED's water supply reliability goals, but makes its major contribution to system flexibility. Conveyance changes can also improve water quality for some diverters. As discussed below, CALFED has incorporated the South Delta Improvements program to address conveyance improvements and related problems in Stage 1.

Watershed Management As a water management tool, the CALFED Watershed Program can help meet the goals for improving the utility of water and access to water. By reducing natural and artificial pollutant loads in waterways, the Watershed Program can increase the utility of water for downstream uses of all kinds. Similarly, watershed restoration activities can improve the ability of a watershed to retain water for all uses and to reduce adverse effects of flood events.

Water Quality Improvements Water quality improvements are essential to meeting CALFED's goal of increasing water utility. The CALFED Water Quality Program includes actions to address parameters of concern for urban, agricultural, and environmental uses of Bay-Delta waters. As discussed above, other water management tools can help achieve water quality goals. New or reoperated storage and conveyance facilities can capture higher quality flows for future uses. Water transfers can be used creatively to direct higher quality water to the more sensitive beneficial uses. Water use efficiency measures can directly reduce the volume of pollutants entering the system. Levee maintenance and improvements can increase the protection of water quality from catastrophic salinity intrusion.

Operational Strategies CALFED's Water Management Strategy includes efforts to enhance real-time monitoring to improve system flexibility and water utility. For example, the majority of fish entrainment for a particular species at water diversion facilities typically may occur during only a short period of time. If that time can be predicted in advance through a monitoring program, diversions can be curtailed and entrainment dramatically reduced with a relatively low reduction in diversion levels. Similarly, greater water diversions could be appropriate during periods when monitoring shows that entrainment is not a major issue. Real-time monitoring can also significantly improve water utility by helping coordinate operational changes for biological benefits with other needs such as water quality. Monitoring is essential for the success of every water management tool so that progress can be measured and adjustments made where necessary. CALFED's Science Program will provide appropriate real-time monitoring to enhance the effectiveness of the CALFED Water Management Strategy.

Comparison of Tools The chart on the following page compares how different water management tools contribute to CALFED's water supply reliability goals. None of the individual water management tools meet all of the goals and each tool provides somewhat different opportunities and limitations. A combination of water management tools will be necessary to provide significant improvement in water supply reliability.

Water Supply Reliability Goals & Objectives	Water Management Tools												
	Long-Term and Short-Term Water Transfers	Water Conservation			Water Recycling	Storage (ISI)				Conveyance (South Delta Improvements)	Watershed Management	Water Quality Control	Operational Strategies, Monitoring, Diversion Management
		Agricultural	Urban	Wetlands		Groundwater & Conjunctive Use	New Surface Storage	Hydropower Reop.	Fish Barrier Assessment				
Goal A: Increase the utility of available water supplies	.	•	•	.	•	•	•	.		.	.	●	•
Goal B: Improve access to existing or new water supplies, in an economically efficient manner, for environmental, urban and agricultural beneficial uses	●	•	•	•	•	•	•	.	.	•	.	.	.
Goal C: Improve flexibility of managing water supply and demand to reduce conflicts between beneficial uses, improve access to water supplies, and decrease system vulnerability	•	●	●	•		●	.	.	•

blank = tool provides negligible or no contribution to meeting objectives

• = tool provides minor contribution to meeting objectives

• = tool provides moderate contribution to meeting objectives

● = tool provides strong contribution to meeting objectives

Implementation of the Water Management Strategy

Given that the CALFED Program will be implemented in stages over 30 years or more, the Water Management Strategy must consider at least two time frames: Stage 1 of the CALFED Program, when not all tools are available to the same degree, and the long term, when more tools can be implemented to provide water management improvements.

The following guidelines for implementation help identify actions for all stages but would be especially useful during Stage 1 of the Program:

- Implement actions with **early** and lasting benefits for water supply reliability.
- Implement actions with **multiple** benefits. These can include multiple benefits for water supply reliability and help meet objectives for other CALFED resource areas.
- Implement actions which are **economical**.
- Use incentives for **local** participation and leverage where possible.
- Institute **operational**, administrative and fiscal actions where possible due to time delay for new facilities.

The long term Water Management Strategy must account for expected changes in environmental, urban, and agricultural water demands over the next 30 years. The foundation of the long term Water Management Strategy will continue to be CALFED's commitment to identify, evaluate, and implement an appropriate mix of all the available water management tools. The components of the Water Management Strategy as it evolves from Stage 1 to the longer term are shown in the following table.

Environmental Water Account (EWA) - The EWA is based on the concept that flexible management of water will achieve fishery and ecosystem benefits more efficiently than a completely prescriptive regulatory approach. The account is dependent on monitoring and real-time diversion management and will be funded each year with dollars, water, and rights to storage and conveyance. These assets will be used to enhance upstream and in-Delta fish protection. For example, the EWA could modify export pumping to avoid times more critical for fish species.

Integrated Storage Investigations (ISI) - The ISI evaluates specific storage opportunities and the relationship between various types of storage and other water management tools. The ISI will provide analyses necessary for CALFED to periodically update and refine the Water Management Strategy throughout the Program implementation. Additionally, these investigations will provide a comprehensive assessment and prioritization of critical fish migration barriers for modification or removal.

Water Management Strategy Implementation Summary		
Tool	Stage 1	Later Stages
Water Transfers	All actions in Water Transfer Program (<i>no quantity targets</i>).	Changes to functioning water market by current state and federal jurisdictional entities (DWR, USBR, SWRCB) or by the legislature.
Agricultural conservation	Actions in Water Use Efficiency Program which are economically feasible locally and statewide.	Additional actions based on economics, market conditions and technical advances.
Urban conservation	Actions in Water Use Efficiency Program which are economically feasible locally and statewide.	Additional actions based on economics, market conditions and technical advances.
Wetlands conservation	Finalize and implement appropriate actions of the Interagency Coordinated Program (ICP) Plan.	Continue to implement appropriate actions from the ICP Plan, modified through adaptive management.
Wastewater recycling	Actions in Water Use Efficiency Program.	Additional actions based on economics, market conditions and technical advances.
Groundwater & conjunctive use	Develop local partnerships through ISI to implement selected projects.	Additional actions based on ISI findings and refinement of WMS.
Hydropower reoperation	Continue evaluation, as needed, through ISI.	Implement based on ISI findings and refinement of WMS.
New surface storage	Pursue implementation of select projects and continue evaluations of other projects through ISI.	Additional actions based on ISI findings and refinement of WMS.
Fish barrier assessment	Identify priorities for modifying barriers through ISI.	Implement in conjunction with the ERP and mitigation of water supply and other impacts.
Conveyance	South Delta Improvements. Study North Delta ecosystem/flood control improvements. Study screened diversion on Sacramento River. Study isolated facility, other water management alternatives to improve drinking water quality.	If appropriate, implement screened diversion on Sacramento River based on study. Present results of study to improve drinking water quality and fishery protection and implement actions.
Watershed management	All actions in Watershed Program (including financial and technical support).	Monitor and adjust actions.
Water quality control	Source control and operational changes. Study operational improvements in ISI. Study other physical improvements and water management options.	Adjust operational guidelines and funding as experience is gained.
Monitoring	Comprehensive monitoring, assessment and research through the CALFED Science Program.	Adjust actions as experience is gained.
Environmental Water Account (EWA)	Provide assets to the EWA (\$50 Million/yr, access to storage and water and ability to flex E/I).	Adjust operational guidelines and funding as experience is gained.

3.6.2 Water Management Strategy Tools: Water Use Efficiency

The CALFED Water Use Efficiency Program (WUE) is one of the cornerstones of CALFED's Water Management Strategy. The CALFED policy toward water use efficiency directs that existing and new water supplies be used efficiently.

The CALFED Water Use Efficiency Program is based on the recognition that implementation of efficiency measures occurs mostly at the local and regional level. The CALFED Water Use Efficiency Program will (1) establish quantifiable objectives, (2) offer support and incentives through expanded programs to provide planning, technical, and financial assistance; (3) monitor progress towards objectives; and, (4) if these objectives are not met, re-evaluate objectives and management options. CALFED agencies will also support institutional arrangements that give local water suppliers an opportunity to demonstrate that cost-effective efficiency measures are being implemented. Some potential water use efficiency benefits, such as water quality improvements, may be regional or statewide rather than local. These are situations in which CALFED planning and cost-share support may be particularly effective.

Potential benefits of the Water Use Efficiency program include:

- Reduces net demand for water
- Reduces fish entrainment as a consequence of reduced pumping or diversion
- Can help in timing of diversions which can reduce entrainment effects on fish
- Could make water available for transfers to water users, the Environmental Water Account, and for environmental flows
- May improve overall Delta and tributary water quality
- Could reduce the total salt load to the San Joaquin Valley

CALFED has committed to implement a robust, incentive-based Water Use Efficiency Program to encourage the efficient use of water in the CALFED solution area. The water use efficiency approach integrates State legal requirements and the practical need for local implementation through a combination of technical assistance, incentives, and directed studies for the four WUE program elements: Agricultural Water Conservation, Urban Water Conservation, Water Recycling, and Managed Wetlands. CALFED actions will build on existing efficiency efforts.

Although details of these elements are currently being refined, implementation is scheduled to begin during 2000. Technical assistance programs and directed studies will begin for all four elements. Incentive programs will begin in late 2000. Incentive programs will be designed to award CALFED grant funding for projects that demonstrate potential to provide CALFED water supply reliability, water quality, or ecosystem restoration benefits.

In many ways, urban water conservation is already a success story. Implementation of water use efficiency measures in Southern California has enabled many areas to hold water use constant while supplying a rapidly growing population. For example, Los Angeles is now using

approximately the same amount of water that it did in 1970, even though its population has increased by 32 percent. CALFED will encourage continuation of the considerable progress already being made in urban water use efficiency. To do so, CALFED will rely substantially on the water use efficiency certification program that is evolving out of the consensus California Urban Water Conservation Council process. This process, which has substantial support from both water agencies and public interest groups, provides for peer review and certification of urban water agency implementation of established Best Management Practices. CALFED will support this urban effort through expanded programs to provide planning, technical, and financial assistance.

In the agricultural sector, CALFED will also rely heavily on the existing Agricultural Water Management Council endorsement process. In developing its program, CALFED organized both an expert review panel and a facilitated stakeholder focus group effort. The review panel and focus group both recommended that CALFED develop regionally-specific strategic plans containing water use efficiency quantifiable objectives. These regional plans are currently being developed, and will include targeted benefits, quantifiable objectives, and regional implementation strategies. CALFED will use the quantifiable objectives and strategic plans in concert with the Agricultural Water Management Council endorsement process to identify and expand planning, technical, and financial programs for water use efficiency in the agricultural sector.

Water use efficiency measures can make available additional water supplies for environmental or consumptive users, and can serve as a useful tool for solving many of the problems in watershed management. Improvements in water use efficiency are anticipated from a wide range of CALFED program elements, and not all of these are reflected in this discussion of the Water Use Efficiency Program. As with other program elements, actions and activities undertaken throughout the CALFED Program can have corollary benefits in other CALFED program areas. For example, CALFED expects to generate substantial water use efficiency incentives through improvements in the water market and through willing-seller water acquisitions for Ecosystem Restoration Program instream flows. In addition, improvements in water quality in the Water Quality Program can assist in meeting water use efficiency goals by reducing the need for water to meet soil leaching requirements and by enhancing water reclamation opportunities. Similarly, actions taken under the Water Use Efficiency Program are expected to have ancillary benefits for other CALFED objectives. Reducing unnecessary surface runoff from farms and urban areas can enhance water quality by reducing the discharge of unwanted substances into watercourses. In addition, WUE measures can improve water supply reliability by increasing the number of opportunities available to water managers. Finally, through the planning and implementation of WUE measures, the cost effectiveness of various storage components will become better defined.

Based on analysis provided in the *Water Use Efficiency Program Plan*, estimates of potential reduction of water application and irrecoverable losses are summarized in the following table. Values in the table represent potential reductions of water application and irrecoverable losses that are most likely to occur for future conditions regardless of the outcome of a CALFED

solution (termed no-action) as well as the potential incremental savings from a CALFED solution. Representative values shown in this summary table are all midpoints in value ranges contained in the *Water Use Efficiency Program Plan*.

The purpose of this table is to give a perspective of the order of magnitude of the potential effects of water use efficiency improvements both with and without the CALFED solution. The values presented are not goals or targets. Rather, they are intended to provide the relative magnitude of potential results of efficiency actions. Actual savings will depend on the magnitude of state, federal and local investment in water use efficiency measures. Stakeholders disagree on the magnitude and/or the feasibility of achieving these values. Stakeholders do agree, however, that water conservation can provide significant benefits for multiple purposes and therefore is a significant contribution to the CALFED solution. Consistent with a programmatic analysis, specific actions or programs that would have to be implemented to achieve these results have not been specified.

The table describes three types of potential reductions:

- Recovered Losses with Potential for Rerouting Flows - These losses currently return to the water system, either as groundwater recharge, river accretion, or direct reuse. Reduction in these losses would not increase the overall volume of water, but might have other benefits such as making water available for irrigation or instream flows during dry periods, improving water quality, reducing energy used for groundwater pumping, decreasing diversion impacts or improving flow between the point of diversion and the point of reentry.
- Potential Irrecoverable Losses - These losses currently flow to a salt sink, deep aquifer, or the atmosphere, and are unavailable for reuse. Reduction in these losses would increase the volume of useable water.
- Potential Reduction of Application - This is the sum of the previous reductions.

	No Action Alternative ¹ (in absence of CALFED)			Potential CALFED Increment			Total Conservation Potential		
	Recovered Losses with Potential for Rerouting Flows (A=C-B) ³	Potential for Recovering Currently Irrecoverable Losses (B) ³	Total Potential Reduction of Application (C) ³	Recovered Losses with Potential for Rerouting Flows (A=C-B) ³	Potential for Recovering Currently Irrecoverable Losses (B) ³	Total Potential Reduction of Application (C) ³	Recovered Losses with Potential for Rerouting Flows (A=C-B) ³	Potential for Recovering Currently Irrecoverable Losses (B) ³	Total Potential Reduction of Application (C) ³
Urban (total delivered water: 12.0 MAF)	397	530	927	355	680	1035	752	1210	1962
Agricultural (total applied water: 31.5 MAF)	2235	220	2455	1676	165	1841	3911	385	4296
Urban recycling ²	55	455	510	188	567	755	243	1022	1265
Total	2687	1205	3892	2219	1412	3631	4906	2617	7523

¹ All figures are in thousand acre-feet and represent forecasts for year 2020. This table comes CALFED's Water Use Efficiency Program Plan

² No Action urban recycling values do not include existing recycling levels of 485,000 acre-feet (the March 1998 *Phase II Interim Report* inadvertently included the existing values).

³ The values in Column B (Potential for Recovering Irrecoverable Losses) and Column C (Total Potential Reduction of Application) were computed explicitly from regional values of applied water, depletion, evapotranspiration of applied water, and other factors. The values in Column A (Recovered Losses with Potential for Rerouting Flows) were computed as the difference between values in Columns B and C.

The Water Use Efficiency Program includes water conservation and water recycling actions to facilitate efficient use of water at the regional and local level. The programmatic WUE actions include the following:

Water conservation related actions include:

- Work with the California Urban Water Conservation Council and the Agricultural Water Management Council to identify appropriate urban and agricultural water conservation measures, set appropriate levels of effort, and, in the case of the urban effort, to identify a proper entity and process to certify or endorse water suppliers that are implementing cost-effective feasible measures.
- Expand state and federal programs to provide sharply increased levels of planning, technical, and financing assistance and develop new ways of providing assistance in the most effective manner.

-
- Help urban water suppliers comply with the Urban Water Management Planning Act.
 - Help water suppliers and water users identify and implement water management measures that can yield multiple benefits including improved water quality and reduced ecosystem impacts.
 - Identify and implement practices to improve water management on managed wetlands.
 - Gather better information on water use, identify opportunities to improve water use efficiency, and measure the effectiveness of conservation practices.
 - Develop, in consultation with the Agricultural Water Management Council, a program of technical and financial incentives to achieve local-level implementation of water use efficiency measures in the agricultural sector. The financial incentives should generally take the form of loans for actions that have been identified as cost-effective for the district in a water management plan approved by the Agricultural Water Management Council. The financial incentives should generally take the form of incentive grants for water use efficiency measures that are supplemental to measures that are cost-effective at the district level.
 - Identify, in region-specific Strategic Plans for Agricultural Areas, quantifiable objectives to assure improvements in water management. Quantifiable objectives are objectives for improvements in water management which can be measured or otherwise tracked to assure that such improvements occur. Objectives will include outcome indicators based on actual water use. Objectives must be related to specific CALFED objectives and are expected to vary by region.

Water recycling actions include:

- Help local and regional agencies comply with the water recycling provisions in the Urban Water Management Planning Act.
- Expand state and federal recycling programs in order to provide sharply increased levels of planning, technical, and financing assistance (both loans and grants), and develop new ways of providing assistance in the most effective manner.
- Provide regional planning assistance that can increase opportunities for use of recycled water.

As part of its Water Use Efficiency Program, CALFED will propose, after consultation with CALFED agencies, the Legislature, and stakeholders, State legislation that requires appropriate measurement or metering of water use for all water users in the State of California. In developing this legislation, important technical and stakeholder issues will be addressed to define “appropriate measurement,” which is expected to vary by region. Aspects of this definition include the nature of regional differences, appropriate point of measurement, and feasible level of precision.

Assurances will play a critical role in the Water Use Efficiency Program element. The assurance mechanisms are structured to ensure that urban and agricultural water users implement the appropriate efficiency measures. Certain CALFED activities (such as participating as a buyer in a water transfer, receiving water from a drought water bank, or receiving water made available solely because of supply enhancements such as new, expanded, or reoperated facilities) will require water suppliers to show that they are in compliance with the applicable urban or agricultural council agreements and applicable State law. This requirement will result in careful analysis and effective implementation of cost-effective conservation measures identified in those agreements.

A high level of water use efficiency will also be required as a condition for permitting of any new surface storage projects that include water supply reliability as a project purpose. Widespread demonstration of efficient use by local water suppliers and irrigation districts will be a prerequisite to CALFED implementation of such new storage projects. Regulatory requirements and some proposed compliance strategies are described more fully in Chapter 5.

CALFED will facilitate adoption of water use efficiency measures by providing a high level of technical support and financial incentives. Adequate funding for assistance programs will be an important assurance for local agencies. During the first four years of Stage 1, CALFED proposes State and Federal government investment of \$500 million (1/2 state and 1/2 federal), with an additional \$500 million coming from local matching funds. At the end of the first four years of Stage 1, CALFED will prepare a more comprehensive evaluation of program implementation. At that time, it may increase or reduce the targeted conservation goals to reflect actual implementation experience, redirect investments to achieve the most effective water use efficiency results, and/or introduce new programs as necessary and appropriate.

More information on the Water Use Efficiency Program is contained in the revised *Water Use Efficiency Program Plan*, which is included as another appendix to this *Final Programmatic EIS/EIR*.

3.6.3 Water Management Strategy Tools: Water Transfers

The transfer of water between willing sellers and buyers represents an economically and environmentally sound part of the State's water strategy. Voluntary water transfers provide an important water resource management tool by fostering efficient allocation of water resources throughout the state. The successful implementation of CALFED is dependent upon access to California's major water transportation systems and removing other barriers to transfers: physical, institutional and legal. Therefore, the goal of the CALFED Water Transfers Program is to encourage the development of a more effective water transfer market that facilitates water transfers and streamlines the approval process while protecting water rights, environmental conditions, and local economic interests.

Every year, hundreds of thousands of acre-feet of water are transferred between willing parties. Most of these transfers consist of in-basin exchanges or sales of water among Central Valley Project (CVP) or State Water Project (SWP) contractors. For example, in 1997 nearly 288,000 acre-feet of CVP water was transferred by CVP contractors south of the Delta. Since 1993, nearly 1.6 million acre-feet of CVP water has been transferred north and south of the Delta by contractors within the various divisions of the CVP. In addition, approximately 230,000 acre-feet of non-CVP water has been purchased and transferred by the CVP Interim Water Acquisition Program to meet instream flow objectives. In addition to internal CVP or SWP transfers which do not require approval by the State Water Resource Control Board (SWRCB), the SWRCB has reviewed and approved over 1.7 million acre-feet of short-term water transfer proposals throughout the state since 1990.

Generally, past transfers have been successful, and CALFED does not intend to interfere with the historical ability to transfer water. However, some transfers have caused concerns regarding adverse impacts to other water users, to rural community economies and to the environment. They have also highlighted contradictory interpretations of state law, the lack of reliable ways to transport the transferred water across the Delta, and complicated approval processes. Before the value of water transfers as a water management tool can be fully realized, these problems need to be addressed.

Water Transfer Issues

Over the course of the last few years, CALFED work groups have identified a number of issues which constrain the water transfer market. These were sorted into three broad categories to aid in developing resolution:

1. *Environmental, socio-economic, and water resource protection issues* - including:
 - Third party socio-economic impacts
 - Groundwater resource protection
 - Environmental protection in source areas
 - In-Stream Flow (Section 1707) Transfers

-
- Rules/guidelines for tracking environmental water transfers
 2. *Technical, operational, and administrative rules* - including:
 - Transferrable water and application of the “no injury rule”
 - Operations criteria and carriage water requirements
 - Reservoir refill criteria
 - Streamlining the transfer approval process
 3. *Wheeling and access to state/federal facilities (especially for cross-Delta transfers)* - including:
 - Predictability of access for transferring water in state and federal project facilities
 - Wheeling costs

Action Plan

The *Water Transfer Program Plan* describes a strategic plan of actions, policies and processes. CALFED member agencies (USBR, DWR, and SWRCB) have legal and regulatory responsibility for review and approval of most water transfers and also have jurisdiction over many of the storage and conveyance facilities required to make water transfers work. These agencies are in a position to improve or facilitate the operations of the water market by adopting policies and implementing programs that will allow transfers to be completed efficiently while still providing necessary protection from unreasonable adverse impacts on the environment or other third parties. The strategic plan provides direction and prioritization for implementation of CALFED’s Water Transfer Program, and includes the following actions:

1. Interactive California Water Market Information Web Site

- a. **In order to coordinate all of the actions that follow, CALFED agencies will develop the On Tap on-line water market information source for California water transfers.** On Tap will coordinate agency policies and procedures, clarified and defined through other actions described below, into an interactive source for:
 - Database of historic transactions and those pending agency approval;
 - Software program to assist proponents with preparing applications;
 - Public forum for interested stakeholders to discuss policies and procedures governing water transfers;
 - Related tools, links, research, and information.

2. Environmental, Socio-economic, and Water Resource Protection

a. **CALFED will recommend establishment of a California Water Transfers Information Clearinghouse** to ensure that decisions regarding proposed water transfers can be made with all parties in possession of complete and accurate information and to facilitate assessment of potential third party impacts. CALFED believes that improvements in the clarity and understanding of rules and procedures, the timely public disclosure of information on proposed transfers, and the availability of data and research can help ensure that the water market promotes responsible transactions. The Clearinghouse would not function as a regulator, a market broker, or as a water bank. The Clearinghouse would facilitate or perform the following functions:

- Manage operations of On Tap, the on-line information source (see previous action);
- Maintain database of relevant market information;
- Ensure inter-agency coordination;
- Facilitate research and assist with developing useful tools and information;
- Disseminate information on groundwater, cumulative, and local socioeconomic impacts of specific transfers as provided by applicants;
- Report Information Clearinghouse activities to the public and to agencies.

b. **CALFED agencies will require additional water transfer analysis regarding impacts, under their existing authorities.** To the extent permitted under existing law, DWR, USBR, and SWRCB will require transfer proponents to provide analysis of the impacts of a proposed transfer in three areas (dependent on the characteristics of the proposal), in addition to CEQA or other required environmental analysis:

- Local groundwater impacts;
- Cumulative impacts; and
- Third-party socioeconomic impacts

This analysis will be for information and disclosure purposes only and would be used as the basis to approve, condition or deny a transfer only as otherwise permissible under current rules and procedures. Information would be provided by the transfer proponents and disclosed through the California Water Transfers Information Clearinghouse.

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- c. **CALFED agencies will develop improved tracking protocols to ensure that water transferred to an instream flow can be and then is delivered to the intended destination.** Objectives of this effort include:
- Develop an accounting mechanism to be used to test prospective transfers and to verify actual transfers.
 - Assess the need for additional measures beyond California Water Code Section 1707 to protect water transferred to instream flow.
 - Develop an agreed upon level of precision to provide assurance to the necessary parties that the transferred quantity was delivered.
 - Determine needed communication lines between transferring party and tracking entity to ensure a smooth flow of information.
 - Included an adaptive process that allows for periodic refinements in accounting mechanisms and communication lines, if necessary, as experience dictates.
 - Provide mechanisms for assuring that water transferred for instream use is supplementary to water used to meet regulatory requirements, unless otherwise explicitly provided by the terms of the transfer.
 - Clarify the circumstances under which water transferred for instream use may be subsequently diverted for other purposes downstream.
- d. **CALFED agencies will work with stakeholders and the Legislature to assist local agencies in development of groundwater management programs to protect groundwater basins in water transfer source areas.** As part of the Water Management Strategy, a groundwater assistance program (discussed more explicitly under *Storage* tools) will be established to fund studies to gather groundwater data and to enable local entities to develop and implement local groundwater management/monitoring programs. These studies will be used to help evaluate an area's potential for implementing conjunctive use projects designed to help meet CALFED objectives. The groundwater management programs will help ensure that conjunctive use projects will protect the local groundwater resources and correlative rights.

3. **Technical, Operational, and Administrative Rules**

- a. **CALFED agencies will streamline the current water transfer approval processes through development of new tools, clarification of existing policies, refinement of processes and addition of staff and resources.** CALFED proposes to develop streamlined transfer approval procedures for certain kinds of transactions (intra-regional transfers, short-term transfers, dry-year transfers). This streamlining would include "pre-certification" of certain classes of transfers and

expedited environmental review procedures and may necessitate legislation to implement various aspects. Results of these improvements will be disclosed through the web site described in Action 1 above. Actions include:

- convene a panel of stakeholders to draft recommendations for a streamlined transfer approval process;
- support development of legislation as deemed necessary.

In addition, the SWRCB has produced a guidebook which describes some of the existing procedures, rules, and criteria used by the SWRCB, DWR, and USBR during the review and approval of water transfers. (The guidebook can be viewed at www.waterrights.ca.gov).

- b. **CALFED agencies will work with stakeholder representatives to clarify and define what water is deemed transferrable under what conditions.** The objective of this process will be to develop a standardized set of rules for defining transferable water, including variations in the accepted criteria for time or location (i.e., one-year transfers versus multi-year and intra-basin versus inter-basin). The On Tap web site being developed will explain the agencies' policies and will identify areas of technical agreement. This proposed process will also address areas of disagreement between agencies and stakeholders. This should result in a set of water transfer scenarios and applicable definitions. This effort may include adoption of water rights orders or formal rules by the SWRCB during the initial years of CALFED's Stage 1 implementation. It may also require the development of legislation.
- c. **CALFED agencies will work with stakeholder representatives to resolve conflicts over carriage water criteria.** (For this purpose, carriage water is defined as the additional water that may be necessary to accompany a cross-Delta water transfer to maintain water quality or other standards imposed on Delta export operations.) CALFED will facilitate a technical review by CALFED agencies and key stakeholders to help answer the following questions: (1) When is a carriage water requirement properly imposed on a cross-Delta water transfer? (2) When carriage water is required, what is the best method for calculating or quantifying the amount of carriage water? Clarification of this requirement is necessary so that proponents can adequately evaluate and account for the potential impacts from a carriage water requirement while they are still negotiating their transfer arrangement. This will result in a better understanding of risk potential and assignments of responsibility between seller, buyer, and other parties. In addition, CALFED will facilitate discussions as necessary to implement outcomes of the State Water Resources Control Board's Phase 8 of the Bay-Delta Hearings.

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- d. **CALFED agencies will work with stakeholder representatives to develop criteria that protect other legal users of water from injury as a result of refill of a reservoir after the transfer of stored water.** Objectives of this effort include:

- Articulate a basis for why refill criteria is necessary.
- Develop criteria that are consistent and understandable by transfer proponents.
- Define when refill criteria is applicable.
- Define how the quantity of refill is calculated.
- Focus on minimizing impacts to CVP and SWP water operations.

Similar to carriage water requirements, standardizing refill requirements will allow proponents to adequately evaluate and include the effects of reservoir refill requirements while they are still negotiating their stored water transfer arrangement. This will allow for better understanding of risk potential and assignments of responsibility for mitigating any affects to CVP or SWP water supplies.

4. **Wheeling and Access to State/Federal Facilities**

- a. **CALFED agencies will improve forecasting tools and more widely disclose potential pumping and conveyance capacity in project facilities,** including limiting factors and inherent risks. The intent is to provide transfer proponents with forecasts regarding the potential availability of conveyance capacity for cross-Delta water transfers and the probabilities of its availability. Forecasts also could be provided for other portions of project conveyance facilities, as needed. Forecasts would occur on a monthly basis (in conjunction with water supply forecasts) and would be based on the best information available to project operators.

A forecast would not guarantee that the capacity will be available because of the variability of operating criteria. These include but are not limited to: hydrologic conditions, ESA requirements, Delta water quality standards, discretionary actions, and physical capacity limitations. Forecasts would be developed in conjunction with, or as part of, the deliberations of the CALFED Operations Group (a forum for inter-agency discussion and decision making regarding state and federal water project operations), and would be disclosed through the On Tap web site.

- b. **CALFED agencies will work with stakeholder representatives to consider modification of policies and procedures for transporting non-project water through existing project water conveyance facilities.** Such policies and

procedures include how to determine priorities, how to process requests, and how to calculate unused capacity. CALFED will initially work with DWR and USBR to identify potential policy modifications. Stakeholder discussions will begin after an initial set of options and assessments of each option is developed. Recommended solutions may require development of legislation. CALFED will support the development of any legislation as needed.

- c. **CALFED agencies will work with stakeholder representatives to develop cost criteria associated with transporting transferred water through state or federal conveyance facilities.** This issue is currently the subject of draft legislation which is being negotiated outside the CALFED process. If legislation is enacted which establishes new rules for cost allocations associated with wheeling transferred water, the new rules will be incorporated into the applicable agencies' procedures. If the legislative effort does not resolve this issue, CALFED may facilitate further discussion among CALFED agencies and stakeholders in an effort to agree upon a set of criteria governing the determination of transport costs such that transfer proponents can factor such costs into proposals early in the development phase of a potential water transfer. These efforts may result in the development of legislation. CALFED will support such development activities as needed.

More detailed information on the issues and these recommended actions is included in the *Water Transfer Program Plan*, another appendix to this *Programmatic EIS/EIR*.

3.6.4 Water Management Strategy Tools: Conveyance

The Delta water conveyance component of CALFED's Water Management Strategy has been the focus of sustained and substantial public interest. In fact, this component has served as the primary variable program component in the CALFED alternatives analysis. As such, conveyance options have undergone considerable review and refinement in the Program.

Developing Conveyance Alternatives

At the beginning of Phase II of the CALFED Bay-Delta Program, seventeen alternative variations were developed around the three broad alternatives (existing system conveyance, modified through-Delta conveyance, and dual Delta conveyance) resulting from the Phase I work. Five alternative variations were eliminated due to technical problems or to reduce duplication where two or more alternatives achieved the same Delta conveyance function. The remaining twelve alternative variations were described in the *Project Alternatives Technical Appendix* to the March 1998 *Draft Programmatic EIS/EIR*.

To help the comparison of alternatives, the twelve alternative variations were grouped into three broad categories:

Alternative 1 - Includes program elements for ecosystem restoration, water quality, levee and channel integrity, water use efficiency, water transfers, and watershed management. In addition, Alternative 1 proposes the use of existing Delta channels, with some modifications, and various storage options.

Alternative 2 - Includes program elements for ecosystem restoration, water quality, levee and channel integrity, water use efficiency, water transfers, and watershed management. In addition, Alternative 2 proposes significant modifications of interior Delta channels to increase water conveyance across the Delta, combined with various storage options.

Alternative 3 - Includes program elements for ecosystem restoration, water quality, levee and channel integrity, water use efficiency, water transfers, and watershed management. In addition, Alternative 3 includes Delta channel modifications coupled with a conveyance channel that takes water around the Delta, combined with various storage options.

Distinguishing Characteristics

Looking simultaneously at all the information on how well the alternatives meet the objectives and how well they satisfy the solution principles would be nearly impossible due to the large amount of information. Furthermore, many aspects of the alternatives do not vary from one alternative to another. They all include program elements that make significant progress toward meeting program objectives and reducing conflict in the system.

On the other hand, there are aspects that do differ among the alternatives and it is these aspects, or distinguishing characteristics, that guided the evaluation. These characteristics are important when assessing the performance, impacts and overall merits of each alternative. Following are the eighteen identified distinguishing characteristics:

- **In-Delta Water Quality** - provides a measure of **salinity** and **flow circulation** for four areas of the Delta. The measure focuses on water quality for in-Delta agricultural uses.
- **Export Water Quality** - provides a measure of **salinity**, **bromide**, and **total organic carbon** for four export diversion locations from the Delta. The measure focuses on municipal/industrial uses for the North Bay Aqueduct and Contra Costa Intake and for agricultural and municipal/industrial uses for the SWP and CVP export pumps in the south Delta.

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- **Diversion Effects on Fisheries** - intended to include only the **direct effects on fisheries due to the export diversion intake and associated fish facilities**. These will vary depending on diversion location, size, type, method of handling bypassed fish, and annual volume of water diverted. The effects on flow patterns in the Delta as a result of the diversion are addressed in the distinguishing characteristic for "Delta Flow Circulation". The loss of fish due to diversion to another route is covered in this effect.
 - **Delta Flow Circulation** - is intended to include the **direct and indirect effects of water flow circulation on fisheries due to the export diversions and changes in cross-Delta water conveyance facilities**. These will vary depending on diversion location, size, type, and operation of conveyance facilities, and annual volume of water diverted.
 - **Storage and Release of Water** - provides a measure of the environmental benefit or adverse effects of storing water in new Program storage facilities and releasing that water at a later time of need. Storing the water will generally result in some degradation of environmental conditions while releasing that water, for whatever use, will generally result in some environmental benefits.
 - **Water Supply Opportunities** - is a measure of the change provided by the alternatives for water supply for the environment and for agricultural and urban uses.
 - **Water Transfer Opportunities** - is an estimate of how well each alternative can carry water that may be generated through market sales or trades at different locations in the system. This estimate assumes that a certain amount of conveyance capacity has already been allocated for state and federal project water.
 - **Operational Flexibility** - provides an indication of how well each alternative can shift operations as needed from time to time to provide the greatest benefits to the ecosystem, water quality, and water supply reliability.
 - **South Delta Access to Water** - is a measure of how the alternatives affect local beneficial use of water in the vicinity of the state and federal Delta export facilities due to changes in water levels and water quality in the channels.
 - **Risk to Export Water Supplies** - is intended to provide a measure of which alternatives best reduce the risk to local and export water supplies from a catastrophic earthquake.
 - **Total Cost** - will include the initial capital costs for the Program as well as annual costs. Initial costs will include study, design, permitting, construction, mitigation,

acquisition, and other first costs of the Program. Annual costs will include operation and maintenance, monitoring, recurring annual purchases, and other annual costs.

- **Assurances Difficulty** - is an estimate on how difficult it will be to formulate an assurance package and get consensus among agencies and stakeholders. It is not an assessment on the perceived effectiveness of the assurance package.
- **Habitat Impacts** - is an assessment of the adverse habitat impacts due to implementation of the CALFED actions.
- **Land Use Changes** - is primarily a measure of the amount of agricultural land that would change to other uses by implementation of the Program.
- **Socio-Economic Impacts** - include adverse and beneficial impacts on commercial and recreational fishing, farm workers, power production, and others indirectly affected by Program actions.
- **Consistency with Solution Principles** - provides a qualitative measure of how well the alternatives meet the Program solution principles. Alternatives which violate the solution principles are not likely to be practicable or implementable. The solution principles provide insight in considering tradeoffs among the other distinguishing characteristics in a balanced manner.
- **Ability to Phase (Stage) Facilities** - provides an indication on how easy it will be to stage implementation of storage and conveyance facilities over time.
- **Brackish Water Habitat** - In the Bay-Delta system there is a salinity gradient between fresh and salt water. The western Delta is an area of important aquatic habitat with salinity levels of approximately 2 parts per thousand. The location of this salt concentration, known as X2, is an indicator of effects on this critical brackish water habitat among the alternatives.

Evaluation of Conveyance Alternatives

The March 1998 *Phase II Interim Report* provided a summary of preliminary analyses with these eighteen distinguishing characteristics. In these analyses, two key distinguishing characteristics were particularly important in identifying how well the alternatives perform. **Export Water Quality** and **Diversion Effects on Fisheries** are highly dependent on the alternative selected. Therefore, irrespective of whether these two characteristics are the most important to selection of the Preferred Program Alternative, they are the characteristics most dependent on that decision.

Based on the assumptions made for evaluations in the March 1998 *Phase II Interim Report*, the dual Delta conveyance with an isolated facility appeared to provide greater technical performance than the other alternatives. At the same time, however, there are still major assurances issues associated with this approach, and CALFED needs to obtain better scientific information plus information on an array of other water management options to assess the need for the dual Delta conveyance. In addition, while the dual Delta conveyance may have technical advantages over other Delta conveyance, it would likely take a decade or more to plan, design, permit, and construct.

To address the assurances, need for better scientific information, and long lead time required for the dual Delta conveyance, CALFED more fully integrated adaptive management throughout the program elements. This led to structuring implementation in stages over time. Each stage begins implementation of certain actions, gathers scientific information to help future decisions on other actions, and provides greater assurances that actions within each stage will move forward together and will be operated as intended. With this approach, a more informed decision on the need for the dual Delta conveyance can be made in the future.

The CALFED strategy regarding conveyance must consider fisheries and water quality for in-Delta uses and drinking water. These factors are critical to conveyance decisions both now and in the future as part of adaptive management. The existing Delta channels will be an integral part of CALFED's strategy for Delta conveyance. The reliance on these channels provides a shared interest in restoring, maintaining, and protecting Delta resources, including water supplies, water quality, levees, channel capacities, natural habitat, and the common Delta Pool, which also protects in-Delta agricultural uses. Some modifications to these through-Delta channels can improve all of these Delta resources.

Because of the many complex interactions within the Bay-Delta system, successfully implementing a through-Delta strategy requires careful balancing of actions to address a wide range of concerns, including water quality, flood control, fisheries, water levels, circulation patterns, channel scour and sediment deposition. Actions which improve water quality and flow direction in one region of concern, for example, may in turn create adverse impacts elsewhere. The understanding of these complex hydrodynamic, biological, and chemical interactions is still incomplete so it will be necessary to approach the optimization of CALFED's strategy with a high degree of cooperation, rigorous monitoring, scientific analysis, and an open-minded approach to solution options. It will also be essential that the implementation of proposed solution actions be linked so that the appropriate balance of benefits and impacts is maintained throughout the implementation period.

CALFED's Delta Conveyance Strategy

CALFED's strategy is to develop a through-Delta conveyance alternative based on the existing Delta configuration with some modifications, evaluate its effectiveness, and add additional

conveyance and/or other water management actions if necessary to achieve CALFED goals and objectives. The initial through-Delta conveyance will be continually monitored, analyzed, and improved to maximize the potential of the through-Delta approach to meet CALFED goals and objectives, consistent with the CALFED Solution Principles. If the through-Delta conveyance fails to meet the CALFED goals and objectives, there will be a reassessment of the reasons and the need for additional Delta conveyance and/or water management actions.

As noted above, CALFED has identified two factors, export water quality and diversion effects on fisheries, as especially important for evaluating the effectiveness of the CALFED conveyance alternative. These and other factors will be continually reevaluated during Stage 1 as part of the adaptive management process. Under the Preferred Program Alternative, some additional actions may be taken to enhance the through-Delta alternative. For example, proceeding with a screened diversion facility on the Sacramento River is a potential additional action that could proceed after project-level environmental documentation, feasibility studies, and successful resolution of project-specific fishery impact issues. Other actions to enhance the CALFED conveyance strategy, such that CALFED goals and objectives could be achieved, would require consideration of a variety of alternatives and evaluation of available new information. This evaluation would take place in a supplemental programmatic evaluation focused on the goals and objectives that have not been achieved in addition to project-level evaluations. For example, if ongoing evaluation indicates that CALFED is not achieving its goals and objectives using the through-Delta alternative, supplemental programmatic evaluation of a number of water management options, including an isolated conveyance facility, would be conducted and a decision made based on this evaluation.

As noted above, CALFED recognizes the need to develop solutions to the conveyance issues that provide appropriate balance in meeting all of CALFED's goals and objectives. CALFED believes that benefits to water quality and water supply reliability gained by conveyance improvements in Stage 1 and beyond must be shared between both consumptive and environmental water uses. Defining how the benefits are shared for particular projects will be determined during the implementation process.

Details of the initial Delta conveyance improvements will be determined after comprehensive, project-level environmental analyses and technical studies are completed, but they are expected to include the following actions and considerations:

In the south Delta region--

Some of the actions listed below are components of the "South Delta Improvement Program" which has been under study and development for a number of years. The list also includes other actions to improve ecosystem function, water quality, and water supply reliability. These components will go forward following the completion of project-specific environmental documents.

The specific elements included in the recommended approach are:

- Implement regional Ecosystem Restoration Program goals (specific actions for early implementation need to be identified).
- Consolidate and screen local agricultural diversions based on an appropriate priority and initiate a screen maintenance program.
- Develop a strategy to resolve regional water quality problems including actions to improve San Joaquin River dissolved oxygen conditions and San Joaquin River drainage as described in the CALFED Water Quality Program. Evaluate the feasibility of recirculation of water pumped from the Delta by the CVP and SWP. If feasible, and consistent with CALFED ecosystem restoration goals and objectives, implement a pilot program.
- Implement the Vernalis Adaptive Management Plan. Include development of a long-term plan describing actions of the San Joaquin River Group Authority to improve water management practices.
- Construct a 500 cfs test facility at the Tracy Pumping Plant to develop best available fish screening and salvage technology for the intakes to the SWP and CVP export facilities.
- Construct a new screened intake for Clifton Court Forebay for the full export capacity of the SWP.
- Implement Joint Point of Diversion for the SWP and CVP.
- Evaluate and decide on whether to retain a separate CVP intake facility or to consolidate with the SWP facility. An intertie between Clifton Court Forebay and the Tracy Pumping Plant will be required if the export location is consolidated at Clifton Court and will be evaluated if exports continue at both locations. Also evaluate and potentially implement an intertie between the projects downstream of the export pumps.
- Obtain permits to use full SWP capacity of 10,300 cfs for operational flexibility, consistent with all applicable operational constraints, for water supply and environmental benefits. Facilitate interim SWP export flexibility up to 8500 cfs, with appropriate constraints.
- Increase SWP pumping by 500 cfs from July through September.

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- Install operable barriers to ensure water of adequate quantity and quality for beneficial uses within the South Delta. Barrier alternatives include installation of an operable Grant Line Canal barrier, which would be constructed and operated in accordance with conditions and directions specified by the U.S. Fish and Wildlife Service, the California Department of Fish and Game and the National Marine Fisheries Service. In the interim prior to installation of permanent operable barriers, DWR would continue to install temporary barriers on an annual basis.
 - Extend and screen agricultural intakes as required to assure local water supply availability.
 - Monitor barrier effects on fish, stages, circulation, and water quality.
 - Implement mitigation actions for direct and indirect project features and actions.
 - In coordination with regional ERP actions, improve flood control through levee improvements, levee setbacks, channel dredging, and flood plain restoration.

In the north Delta region--

- Develop operational criteria and initiate operational studies (such as more intense fish monitoring on both sides of the Cross Channel, opening and closing the gates on tidal cycles, etc.) for the Delta Cross Channel that balances flood control, water quality, water supply reliability, and fisheries concerns.
- Study and evaluate a screened diversion structure on the Sacramento River of up to 4,000 cfs. This evaluation would consider how to operate the Delta Cross Channel in conjunction with this new diversion structure to improve drinking water quality, while maintaining fish recovery. If the evaluation demonstrates that the diversion facility is needed to improve water quality in the Delta and at the export facilities, and can be constructed and operated without adverse effects to anadromous and estuarine fish, construction will begin late in Stage 1. This facility would likely include a fish screen, pumps and a channel between the Sacramento and Mokelumne Rivers. The design, size and operating rules for this facility would allow for analyses of impacts to upstream and downstream migrating fish as well as impacts from habitat shifts resulting from increased flows in the eastern Delta on Delta species.
- Construct new setback levees, dredge and/or improve existing levees along the channels of the lower Mokelumne River system from Interstate 5 downstream to the San Joaquin River to improve conveyance and resolve flood concerns in this region. These actions would be carefully coordinated with ecosystem restoration

actions to create additional tidal wetlands and riparian habitat to assure that a balanced solution to local and regional concerns would be achieved.

Throughout the Delta region--

- Conduct localized channel dredging as needed to restore and maintain sufficient channel capacities to support balanced beneficial uses, including flood control, navigation, recreation, fisheries, water quality, water levels, and circulation.

Future Conveyance Actions

CALFED will evaluate progress towards achieving its water quality and species recovery goals and objectives during Stage 1 with the advice and assistance of expert panels as described in the Water Quality and Ecosystem Restoration sections of this report. The deliberations of those panels will be part of the open, public decision making process CALFED will follow to determine if different conveyance and/or other water management actions should be evaluated in order to achieve water quality and species recovery goals and objectives.

CALFED will use the advice of water quality expert panels, the Delta Drinking Water Council, and the ERP Science Review Panel to conduct program reviews in 2003 and 2007 with stakeholder involvement to assess whether Stage 1 actions to meet CALFED goals and objectives have been successful and determine whether modifications in conveyance and/or additional water management actions should be evaluated to simultaneously achieve species recovery, water quality improvement, levee system integrity, and water supply reliability. CALFED will present the results of these reviews to the Legislature and Congress, along with its recommendations, if any, for legislative action.

In the event of a finding that a through-Delta conveyance system is inadequate to achieve CALFED goals and objectives, additional actions, including an isolated facility, source water blending or substitution, and other actions will be intensively evaluated through supplemental programmatic analysis for their ability to solve these problems, and a decision made to proceed with the most appropriate actions. If an isolated facility were ultimately found to be necessary for achieving CALFED's goals and objectives, it would be designed with each of the following assurances:

1. An agreement limiting the amount, or proportion, of water that can be exported (linked to water year types and flexible enough to allow additional exports when conditions allow) and needed assurances for compliance
2. Commitment to continuous improvement of in-Delta water quality sufficient to protect existing beneficial uses (Delta standards or contracts including assurances for implementation, permits, financing, and Operations and Maintenance)

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3. Commitment to avoid potential seepage and flood impacts of an isolated facility along its alignment
 4. Long-term funding for Delta levees (perhaps tied to quantity of water moved in the isolated facility or other institutional assurances) and commitment to provide at cost, suitable excess excavated material from facility construction for levee and habitat improvements
 5. Reaffirm commitment to protect all area of origin water rights and to continue implementation of the 1959 Delta Protection Act
 6. Completion of all environmental documentation and permitting requirements
 7. Demonstrated commitment to finance by beneficiaries
 8. Agreement on operating authority and operating criteria
 9. A determination that the through-Delta conveyance with the other program elements cannot meet CALFED goals and objectives, and that an isolated conveyance facility is the most cost-effective and least environmentally damaging measure to correct this deficiency in meeting the goals and objectives
 10. A decision to proceed with implementation of the Program will come through State and potentially federal legislative action. CALFED intends that this legislative action will not include legislative overrides or exemptions from State or federal environmental laws (including, but not limited to, the federal and State ESA, the Clean Water Act, NEPA or CEQA).

3.6.5 Water Management Strategy Tools: Storage

Integrated Storage Investigation

As part of its ongoing evaluation of the appropriate role of storage alternatives in the CALFED solution, CALFED has initiated the Integrated Storage Investigation. The ISI will coordinate existing storage investigations by individual CALFED agencies, CALFED-initiated storage evaluations and broader water management strategies and analysis to provide a comprehensive assessment of alternative storage options and their utility to overall water management.

Storage of water in surface reservoirs or groundwater basins can provide opportunities to improve the timing and availability of water for all uses. The benefits and impacts of surface and groundwater storage vary depending on the location, size, operational policies, and linkage to other program elements. By storing during times of high flow and low environmental impact,

more water is available for release for environmental, consumptive, and water quality purposes during dry periods when conflicts over water supplies are critical. Storage which is properly managed and integrated with other water management tools can achieve significant improvements for a number of CALFED's water management objectives: reduce conflicts, decrease drought impacts on all beneficial uses, increase supply availability, increase operational flexibility, and improve water quality.

The particular attributes of storage in CALFED's Water Management Strategy vary by the type and location of storage. Water storage located upstream of the Delta functions differently than storage located south of the Delta in the export area. Generally, groundwater projects have more benign on-site environmental and land use impacts than surface storage. Surface storage is more suited to rapidly discharging or receiving large volumes of water, an advantage in real-time management of high river flow periods or environmental storage releases. Offstream surface storage projects generally have less environmental impacts than new on-stream projects. Nevertheless, both surface and groundwater storage projects create additional environmental impacts, including on-site impacts and direct and cumulative impacts caused by water diversions into the storage projects. Further, inappropriate public investments in new surface or groundwater storage may reduce incentives to invest in water conservation programs and other water management strategies.

Based on a programmatic evaluation of potential water supply benefits and practical consideration of acceptable levels of impacts and total costs, the range of total new storage considered for evaluation in Phase II was from zero up to about 6 MAF. This was considered a reasonable range for study purposes and impact analysis; more detailed study and significant interaction with stakeholders will be required as project-level planning and environmental analysis occurs at specific locations. Most water supply benefits of Sacramento River off-stream or enlarged on-stream surface storage are achieved with about 3 MAF of storage, while most water supply benefits of south of Delta off-aqueduct surface storage are attained with about 2 MAF of storage. Other types of surface storage considered in Phase II include San Joaquin River tributary storage and in-Delta storage.

Considering the magnitude of conflicts over available water in California, CALFED believes that it must continue to evaluate and implement a broad range of water management options to achieve the Program's objectives. Therefore, new or expanded storage will be developed and constructed, together with aggressive implementation of water conservation, recycling, an improved water transfer market, and habitat restoration, as appropriate to meet CALFED Program goals. Implementation of new or expanded surface and groundwater storage will be predicated upon completing site-specific feasibility studies and complying with all environmental review and permitting requirements.

Site-specific studies of storage opportunities will be coordinated under the ISI. Specifically, the ISI will evaluate surface storage, groundwater storage, power facility re-operation, where appropriate, and the potential for conjunctive operation of these different types of storage. These

investigations, as part of the Water Management Strategy, will contribute to compliance with the Clean Water Act Section 404 Guidelines requirement to select the least environmentally damaging practicable alternative to constructing new storage facilities. Additionally, these investigations will provide a comprehensive assessment and prioritization of critical fish migration barriers for modification or removal.

The study elements within the Integrated Storage Investigation include:

Comprehensive Planning The ISI will provide information to help CALFED continue to refine and periodically update the Water Management Strategy. ISI studies will evaluate the utility of specific storage projects in providing water quality, water supply reliability and ecosystem benefits. This information, together with information gained from implementation of other CALFED Program elements and updated information on California's changing water management needs, will be considered in an Evaluation Framework. This Framework will include: (1) a comprehensive hierarchy of objectives for the CALFED Program, (2) well-defined measures of performance associated with the achievement of objectives, and (3) provide a basis for comparison of alternative long-term water management strategies. The Evaluation Framework will provide a structure for periodically updating the Water Management Strategy and determining appropriate levels of future investment in various water management tools.

Groundwater/Conjunctive Use Programs CALFED has developed a framework for evaluation and development of additional groundwater and conjunctive use opportunities, based on voluntary participation by local water management entities. The proposed framework would provide opportunities for intensified groundwater monitoring, modeling, and evaluation of local and regional opportunities as well as potential impacts and mitigation requirements. It calls for use of pilot studies to methodically assess opportunities and impacts before full implementation. In addition, DWR and USBR are pursuing cooperative partnerships with local agencies to study and implement specific groundwater banking and conjunctive use opportunities. DWR's North of Delta Off-Stream Storage Study also includes evaluation of opportunities for exchanges and groundwater management in conjunction with surface storage. The ISI will identify beneficial pilot projects and develop operational strategies to optimize conjunctive management opportunities with existing and potential new surface storage. See Groundwater and Conjunctive Management below for more detail.

Surface Storage Investigations CALFED and its cooperating agencies have conducted a preliminary screening of potential surface storage locations and project configurations, then selected a smaller number for more detailed evaluation. The screening process, although it has already provided preliminary guidance for more detailed investigations, continues to be refined to assure consistency with current planning conditions and available environmental data.

Subsequent evaluation will focus on surface storage sites with the most potential for helping meet CALFED goals and objectives in Stage 1. These will include Shasta Lake Enlargement, Los Vaqueros Enlargement, and In-Delta Storage. In addition, CALFED will evaluate Millerton

Lake Enlargement or equivalent and Sites Reservoir to better define benefits, impacts, and potential implementation. Investigations will be based on engineering, economic, and environmental considerations. See Surface Storage below for more detail.

Power Facilities Reoperation Evaluation Regulatory reform in the electrical power industry has presented an opportunity to evaluate whether existing hydroelectric facilities can be acquired and re-operated for water supply purposes. CALFED's initial evaluation is that, after considering the effects of re-operation on downstream users, water quality, environmental resources, power production, and recreation, the opportunities may be limited, especially at the smaller reservoirs. Nevertheless, these facilities already exist, and could offer benefits for local water supplies or for an Environmental Water Account, as well as providing additional operational flexibility.

Fish Migration Barrier Removal Evaluations As part of CALFED's Ecosystem Restoration Program, some obstructions to fish passage (such as small dams) are being considered for modification or removal in order to restore anadromous fish access to critical spawning habitat. There is a need for a more systematic approach to identifying and prioritizing barriers for future action. The scope of ISI provides an opportunity for such a comprehensive assessment.

Groundwater and Conjunctive Management

One of the major elements of the ISI program includes surface water and groundwater conjunctive management. The goal of the conjunctive management element is to assist local agencies with improving regional water supply reliability by increasing the coordinated use of surface water and groundwater. Working cooperatively, local agencies, basin stakeholders, and DWR on behalf of CALFED will conduct technical, economic, social, and environmental feasibility evaluations of possible conjunctive management projects within each basin.

Appropriate and effective groundwater management and protection is essential to an effective water management strategy and to the success of a broad range of CALFED programs, including water transfers, groundwater banking, watershed management and water use efficiency programs. CALFED recognizes the critical role of local government agencies in protecting and managing groundwater resources, and will actively pursue cooperative partnerships with local agencies to facilitate planning for and implementation of groundwater banking and conjunctive use programs.

To ensure that local concerns and potential impacts are fully addressed, CALFED developed guiding principles for conjunctive use. These principles will frame CALFED's role and participation in conjunctive use programs:

- Local planning processes will be employed.
- Proposed projects will include local control and management.

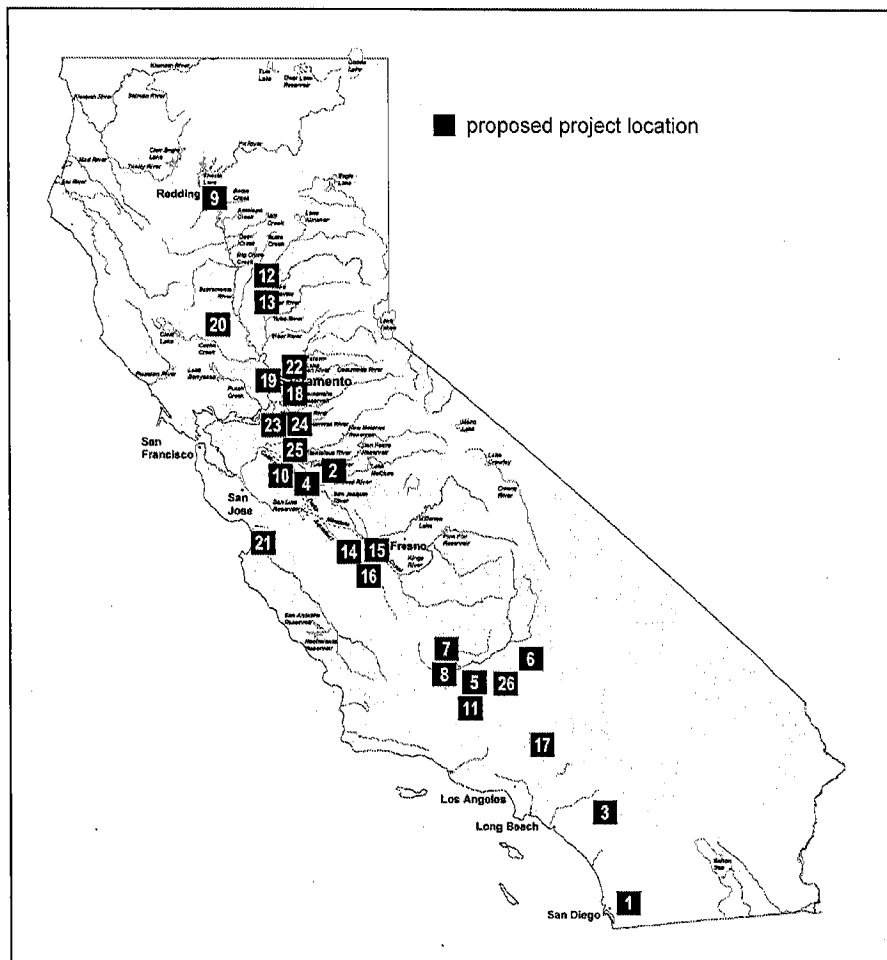
- Implementation of projects will be voluntary.
- In-basin water needs will have priority.
- Out-of-basin transfers will be subject to local management and include compensation.
- Basin-wide planning and monitoring will be implemented.

CALFED's Conjunctive Use Advisory Team, which included stakeholders and staff from CALFED agencies, used the guiding principles to develop a Conjunctive Use Grant program as a preliminary phase of the ISI program. This grant program will help implement locally supported conjunctive use programs that adhere to CALFED's guiding principles.

CALFED received twenty-six grant applications under the Conjunctive Use Grant Application program (see following map and table).

CALFED Conjunctive Use Grant Application Submittals

General Project Locations: 26 Responses



CALFED Conjunctive Use Grant Application Submittals	
Application No.	Project Name
1	Sweetwater Monitoring Wells for Groundwater Demineralization Facility
2	Eastside WD Pilot Groundwater Recharge Basin
3	Elsinore Valley MWD Gage Canal Extraction & Conveyance
4	San Luis & DMWA Regional Conjunctive Use Program
5	Kern-Tulare Conjunctive Use Project
6	Kern County WA Kern Fan Groundwater Pump-In Project
7	Semitropic Banked Water Recover Hookups
8	Semitropic Construction of Monitoring Wells
9	Anderson-Cottonwood ID CU Program
10	City of Tracy Aquifer Storage & Recovery Project
11	Buena Vista WSD Conveyance Improvements for Recharge Ponds
12	Western Canal WD Conjunctive Use Monitoring Project
13	Richvale ID Conjunctive Use Monitoring Project
14	San Luis WD Meyers Farm Groundwater Banking Project
15	San Luis WD Devine Groundwater Banking Project
16	Westlands WD Water Supply Management and CU Program
17	Antelope Valley Littlerock Creek Groundwater Recharge Project
18	City of Sacramento American River Crossing 48-inch Water Main
19	Natomas Central MWC Conjunctive Use Project
20	Maxwell ID Conjunctive Use Project
21	Pajaro Valley Pajaro River at Murphy Crossing
22	ARBCA Regional Conjunctive Use Program
23	San Joaquin County-Wide Conjunctive Use Project
24	North San Joaquin WCD Pilot Recharge Project
25	Stockton East WD Demonstration Groundwater Recharge
26	City of Bakersfield Riverlakes Tie-In

As of the writing of this document, the CALFED selection committee is evaluating and scoring those applications. Up to \$2.15 million is available for this fiscal year, with a maximum grant amount of \$500,000 per project.

Work completed to help develop CALFED's Water Management Strategy included an evaluation of potential groundwater storage in the Central Valley. The preliminary results of this evaluation

revealed that conjunctive management programs that utilize groundwater storage could provide significant improvements in water supply reliability. As a result, CALFED has developed a target of implementing locally managed and controlled groundwater and conjunctive use projects with a total of 500 TAF to 1 MAF of additional storage capacity by 2007 under the ISI program.

These projects will be implemented under the ISI program through partnerships with local and regional interests to obtain local and CALFED Program benefits. As of June 2000, three memoranda of understanding have been negotiated between the ISI program and local agencies. To build on the current ISI efforts, Stage 1 actions will include:

- Finalize agreements with up to six new local project proponents for joint planning and development by February 2001.
- Begin feasibility studies by March 2001 with funding through CALFED and Proposition 13.
- Report on the performance of feasibility studies, implementable projects, and potential benefits and beneficiaries by the end of 2002. The report will separately identify likely local benefits as well as opportunities to benefit statewide water supply reliability and the Environmental Water Account.
- Implement early stages of the most promising projects by the end of 2004. Aggressively pursue implementation of additional projects by the end of Stage 1.

The Implementation Plan in Chapter 4 includes proposed groundwater banking and conjunctive use actions for Stage 1.

Comprehensive groundwater management in California has been an elusive goal, in part because most groundwater is managed at the local level by various water districts and agencies. Ideally, groundwater would be managed by local agencies at the sub-basin level through the planned coordination of local agency groundwater management plans. Groundwater sub-basins, as defined in the Department of Water Resources Bulletin 118, would provide appropriate boundaries for this coordinated planning approach. Such a management system would avoid potential conflicts among groundwater management plans within sub-basins. Therefore, CALFED will support legislation that supports coordinated groundwater management by local agencies at the sub-basin level. CALFED's objective with respect to basin-wide planning is to encourage local agencies to coordinate and integrate existing AB 3030 plans to accomplish stakeholder-driven basin management objectives, while keeping in tact the goals and elements of local plans.

AB 3030, which authorizes local agencies to enact voluntary groundwater management plans within their boundaries, is an important foundation for comprehensive groundwater management in California. AB 3030 also allows agencies to enter into agreements to develop basin-wide

plans but does not require such basin-wide plans to be developed. DWR will adopt regulations for expenditure of grant and loan funds that make funding contingent upon local agencies having an AB 3030 plan or a functional equivalent in place. CALFED will work with local governments and affected stakeholders to develop legislation to strengthen AB 3030 to encourage basin-wide groundwater management plans, in part by conditioning future state funding for water programs on the development of local groundwater management plans by 2004.

CALFED will work with the Legislature to help move California toward basin-wide groundwater management through the coordinated implementation of local agency planning efforts. New legislation should call for management plans that promote the objective of increasing overall water supply reliability while protecting against localized loss of access to water supply, degradation of water quality, and subsidence. This legislation should address the following issues:

AB 3030 - AB 3030 allows local agencies to develop and implement local groundwater management plans. AB 3030 should be strengthened to ensure specific groundwater management plans are completed. Additionally, agencies and districts sharing the same sub-basin should develop coordinated management plans that address both groundwater and surface water. A realistic time frame for agencies to complete groundwater management plans would be two to three years from the date legislation is passed. The legislation should provide that agencies must complete timely plans to maintain access to state water program funding.

California Water Code - Many sections of the Water Code contain language that is either ambiguous or restrictive with regard to facilitating conjunctive use, groundwater banking and groundwater transfers. For example, Water Code Section 1220 precludes the pumping of groundwater for export from the Delta-Sierra Basin, as defined in DWR's Bulletin 160-74, unless the pumping is in compliance with certain conditions. Currently, there are differences in opinion as to what these conditions mean and how they are applied. The new legislation should provide remedy for these uncertainties, while maintaining protections for local groundwater resources.

County Ordinances - The Water Code should be amended to require that county groundwater management ordinances and groundwater management plans adopted by water agencies under AB 3030 or other statutory authority be consistent. The combination of local government ordinance and local agency management plan should complement each other in establishing basin management objectives to increase water supply reliability.

State-level Oversight - CALFED, the Resources Agency, or the Department of Water Resources should provide guidance for local management of surface water and groundwater resources, coordinated at the sub-basin level. Annual reports that discuss

basin water quality, a water budget and coordination activities among agencies and local government would be appropriate. The legislation should contain provisions to clarify the scope of local agencies' authority to manage groundwater, and should provide default rules and definitions to resolve conflicts and ambiguities in local groundwater management schemes.

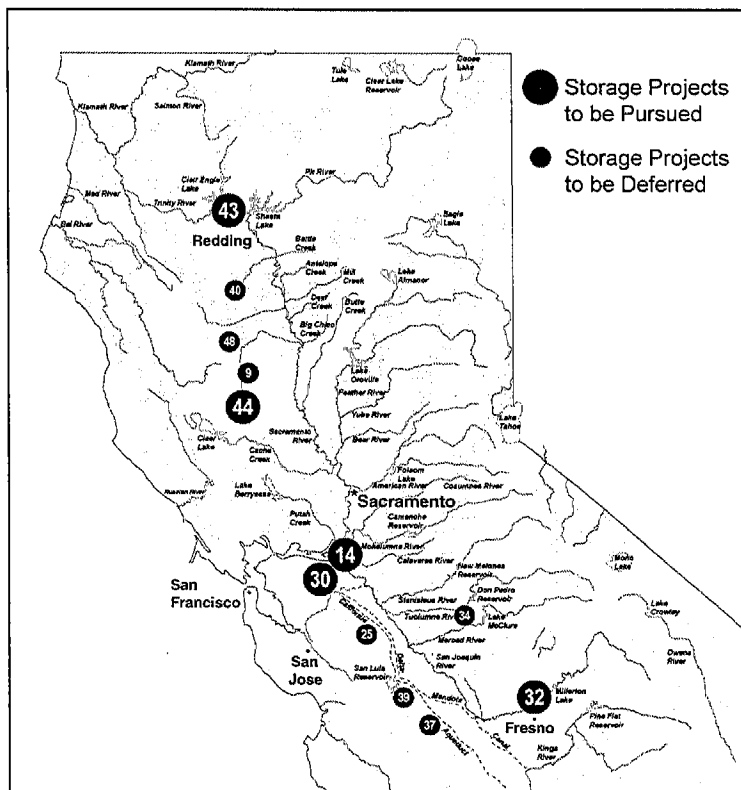
Development of Management Plans - Development of effective groundwater management plans will require improvement in our current scientific understanding of groundwater resources. Few regions have good data on how groundwater moves underground, how fast it recharges, how much can be withdrawn before subsidence occurs, or vegetation is adversely affected. The Department of Water Resources is currently updating DWR Bulletin 118 by collating existing data to establish a water budget for each groundwater basin. At present, this effort is funded for a period of three years.

This program should be funded as a continuous program to collect information on groundwater conditions in each basin to better understand how to manage the resource effectively. AB 303, introduced in 1999, would continue the work undertaken during the current DWR Bulletin 118 update but would provide for collection of additional data. AB 303 would establish a grant program to be administered by the DWR to assist local public agencies with groundwater monitoring and management activities; provide funding for the DWR to update, digitize, evaluate and expand groundwater databases and to update DWR Bulletin 118; and would require that all data generated by such funding would be available to the public. CALFED believes that the provisions of AB 303 should be supported.

Surface Storage

CALFED will focus on off-stream reservoir sites for new surface storage, but will consider expansion of existing on-stream reservoirs. CALFED will not pursue storage at new on-stream reservoir sites. Under the ecosystem restoration program element, some dams and stream obstructions will be removed

Potential Surface Storage Projects



to open additional areas of aquatic habitat to anadromous fish.

For the purposes of the Phase II evaluation, an inventory of fifty-two potential new surface storage projects was compiled. Those projects that appeared most feasible (see above, figure of potential surface storage sites) were identified in the June 1999 Draft Programmatic EIS/EIR and retained for further CALFED consideration. These include twelve potential projects that could contribute significantly to CALFED's multiple purpose objectives. Since release of the June 1999 Draft, CALFED has determined that several of these twelve projects should be pursued in Stage 1, while others should be deferred, as described below.

Analysis conducted for the Environmental Water Account (EWA) has shown a strong need for additional storage to make an EWA work. Without access to additional storage, it is much more difficult to acquire the resources (water) to make an EWA work and provide adequate fish protection, while at the same time maintaining and improving water supply reliability. In the short term, the EWA will need to depend on water purchases/transfers, and this will dominate the water transfers market, making transfers more difficult and or more expensive for other water users. In the longer term, it appears that new or expanded storage will be necessary so that transfer water and conveyance capacity can be made available for other users including upstream environmental users.

Offstream Storage

Traditionally, reservoirs have been created by constructing dams on major rivers to form artificial lakes. These reservoirs are considered onstream storage. In contrast, an offstream storage reservoir is typically constructed on a small and generally seasonal stream that does not significantly contribute to the water supply of the reservoir. Offstream storage involves diverting water out of a river and transporting the water through canals or pipelines to a reservoir that may be miles away from the river. Therefore, offstream storage investigations include extensive evaluation of conveyance facilities to carry the water to the reservoirs.

Based on existing information, some potential storage facilities appear to be more promising in contributing to CALFED goals and objectives and more implementable due to relative costs and stakeholder support. CALFED has organized the potential storage projects into three tiers to reflect these characteristics and guide the next steps in the ISI.

Potential Storage Retained for Additional CALFED Consideration

Project	Location	Type	Gross Storage Capacity
Storage Projects to Be Pursued			
Shasta Lake Enlargement (6 to 8 foot raise of existing dam) (Site 43)	Shasta County Sacramento River	On-Stream Storage	Approximately 300 TAF Additional
Los Vaqueros Enlargement (Site 30)	Contra Costa County Kellogg Creek	Off-Stream Storage	300-400 TAF Additional (up to 965 TAF potential)
In-Delta Storage (Site 14)	Sacramento/San Joaquin Delta	Island Storage in the Delta	250 TAF
Groundwater Conjunctive Use	Sacramento Valley, San Joaquin Valley & So. CA	Long-Term Funding Locally Supported	500 TAF - 1 MAF
Millerton Lake Enlargement or Equivalent (Site 32)	Fresno County San Joaquin River	On-Stream Storage	Additional 720 TAF
Sites Reservoir (Site 44)	Colusa and Glenn Counties Funks & Stone Corral Cks	Off-Stream Storage	1,200 to 1,900 TAF
Storage Projects to be Deferred			
Ingram Canyon Reservoir [Complete ongoing estimates of cost, benefits and impacts, then no further action] (Site 25)	Stanislaus County Ingram Creek	Off-Stream Storage	333 to 1,201 TAF
Montgomery Reservoir (Site 34)	Merced County Dry Creek	Off-Stream Storage	240 TAF
Panoche Reservoir (Site 37)	Fresno County Silver Creek	Off-Stream Storage	160 to 3,100 TAF
Quinto Creek Reservoir (Site 39)	Merced/Stanislaus County Quinto Creek	Off-Stream Storage	332 to 381 TAF
Colusa Reservoir Complex (Site 9)	Colusa/Glenn Counties Funks Creek	Off-Stream Storage	3,300 TAF
Schoenfield Reservoir portion of the Red Bank Project (Site 40)	Tehama County S.F. Cottonwood Creek	Off-Stream Storage	Schoenfield-250 TAF
Thomes-Newville Reservoir (Site 48)	Glenn County Thomes & Stoney Creek	Off-Stream Storage	1,840 - 3,080 TAF

Storage Projects to be Pursued These projects appear to be the most promising in helping to meet CALFED goals and objectives including providing water for a long-term EWA. Based on existing information, they would provide significant benefits and generally result in lower environmental impacts than the remaining sites. Overall, they appear to be the most implementable of the potential storage sites. CALFED will aggressively pursue these projects through full State and Federal commitment to the process and evaluations necessary for implementation. Decisions on the implementation could occur early in Stage 1. CALFED will focus the ISI evaluations on the following projects:

Shasta Lake Enlargement - The Shasta Lake Enlargement would include a 6- to 8-foot raise of the existing dam, expanding capacity by approximately 300 TAF. The enlargement could help offset losses of Trinity River diversions to the Sacramento River, improve the cold water reserve in Shasta Lake to regulate Sacramento River water temperatures, and improve overall water supply reliability. The most significant environmental impact appears to be inundation of a few hundred yards of the McCloud River; the California Public Resources Code Section 5093.542 seeks to protect the free-flowing McCloud River but also provides for investigations for potential enlargement of Shasta Dam.

Los Vaqueros Enlargement - A 300 to 400 TAF enlargement of the existing Los Vaqueros Reservoir could provide unique opportunities for blending to improve Bay-Area drinking water quality and water supply reliability. Its proximity to the Delta would allow filling during times of better Delta water quality. As an existing offstream reservoir, environmental impacts are expected to be relatively low. This effort is subject to a number of mandates and agreements, including a requirement for local voter approval.

In-Delta Storage - Evaluations for the Environmental Water Account have shown the advantages of having storage near the south Delta export facilities. This storage can provide significant benefits in providing additional flexibility in timing of Delta exports and in improving overall water supply reliability. The storage would be formed by transforming one or more Delta islands into storage reservoirs with a capacity of approximately 250 TAF. Impact concerns for in-Delta storage include water quality degradation from storage of water over peat soils and change of land use from agricultural to a storage reservoir.

Groundwater Conjunctive Use - Groundwater conjunctive use can provide opportunities to improve timing and availability of water for all users. Generally, groundwater projects are viewed as having more benign on-site environmental and land use impacts than surface storage. CALFED plans funding for 500 TAF to 1 MAF of new locally supported groundwater projects in Stage 1. While CALFED may also participate in projects in the Sacramento Valley and Southern California, the San Joaquin Valley

appears to provide significant opportunities for early implementation of valuable groundwater conjunctive use projects.

In addition, CALFED will study two potential reservoir locations through partnerships with local agencies:

Millerton Lake Enlargement or Equivalent - An enlargement of Millerton Lake, or equivalent, should be considered in the context of broader San Joaquin River water management including flow and habitat restoration, flood management, conjunctive use, reservoir re-operation and water transfers. The offstream Montgomery Reservoir would be evaluated as one alternative to a Millerton Lake Enlargement. A feasibility study is needed to better define potential benefits and impacts and how the project could complement other ongoing restoration activities on the San Joaquin River.

Sites Reservoir - Sites Reservoir could help water supply reliability for all uses. The project formulation includes consideration of a water exchange program to use the water supply of the project for agricultural and wetland uses within the Colusa Basin in exchange for modifications to diversion patterns from the Sacramento River. Based on preliminary information from the ongoing feasibility evaluation, Sites Reservoir would have less environmental impacts than Thomes-Newville Reservoir, the Colusa Reservoir Complex, or Schoenfield Reservoir. The feasibility study will provide information necessary for a decision on implementation of Sites Reservoir or alternatives.

These two projects will require substantial technical work and further environmental review and development of cost-sharing agreements before decisions to pursue them as part of the CALFED Program. Decisions on implementation would occur in Stage 1.

Storage Projects to be Deferred The remaining sites do not appear to significantly contribute to Program goals and objectives at this time. Some of these may be retained solely for analysis purposes and could serve as alternatives to the above projects. Future progress and experience with implementation of other parts of the Program, such as the Environmental Water Account or south Delta conveyance improvements, could better define potential benefits of these storage projects. CALFED does not plan to pursue implementation of any of the following projects at this time.

Ingram Canyon Reservoir - CALFED is conducting preliminary estimates of costs, benefits and impacts of Ingram Canyon Reservoir. CALFED will complete this preliminary study and then take no further action in Stage 1. New off-aqueduct storage does not show significant contributions to the Program goals and objectives at this time. Current limitations in Delta export capacity also limit the effectiveness of new off-aqueduct storage such as Ingram Canyon. In addition, operation of the Environmental Water Account could further limit the effectiveness of off-aqueduct storage. New groundwater storage in the San Joaquin Valley could further reduce need for off-aqueduct

storage. Improvements in the export capacity, experience with operations associated with the Environmental Water Account, and experience on the effectiveness of new groundwater conjunctive use projects are required before potential benefits of off-aqueduct storage can be better defined.

Montgomery Reservoir - Montgomery Reservoir will be evaluated as an off-stream reservoir alternative to the Millerton Lake Enlargement in Tier Two above.

Panoche Reservoir - New off-aqueduct storage, such as Panoche Reservoir, does not show significant contributions to the Program goals and objectives at this time. (See Ingram Canyon Reservoir).

Quinto Creek Reservoir - New off-aqueduct storage, such as Quinto Creek Reservoir, does not show significant contributions to the Program goals and objectives at this time. (See Ingram Canyon Reservoir).

Colusa Reservoir Complex - Preliminary information from the ISI indicates that the cost of the Colusa Reservoir Complex is high compared with Sites Reservoir. The Colusa Reservoir Complex could be evaluated as an alternative to Sites Reservoir.

Schoenfield Reservoir - CALFED initially envisioned that Schoenfield Reservoir could be economically operated such that the gates at Red Bluff Diversion Dam could be left open longer in the late spring and early summer for fish passage benefits. However, now other promising alternatives for dealing with fish passage at Red Bluff are under investigation by the USBR and may better meet the fish passage needs. In addition, Schoenfield Reservoir appears to have significantly higher environmental impacts than Sites Reservoir. Schoenfield Reservoir could be evaluated as an alternative to Sites Reservoir.

Thomes-Newville Reservoir - Preliminary information from the ISI indicates that the environmental impacts of Thomes Newville Reservoir are high compared with Sites Reservoir. The Thomes Newville Reservoir could be evaluated as an alternative to Sites Reservoir.

The relationship of water supply benefits to groundwater and surface storage volume is highly dependent on operating assumptions. More detailed information about specific locations of new storage, potential allocation of storage benefits, and operational goals and constraints would be necessary to determine an optimal volume of storage from a water supply perspective. In addition, long-term effective groundwater management throughout California will be essential to a range of CALFED Programs, including water transfers, groundwater banking, watershed management, and water use efficiency programs.

A fundamental principle of the CALFED Program is that the costs of a program should be borne by those who benefit from the program. That principle is especially relevant in the decision about new storage facilities. CALFED will seek public financing for the planning and evaluation of storage projects to ensure a comprehensive and fair comparison of storage options. However, should a storage project proceed to construction, then the public funds used for planning and evaluation will be reimbursed by the project beneficiaries. This "beneficiary pays" principle is critical to the overall CALFED goal of increasing the efficiency of water use in California.

Decisions to construct groundwater or surface water storage will be predicated on compliance with all environmental review and permitting requirements, and maintaining balanced implementation of all Program elements. CALFED will undertake an annual review (see the third paragraph of Section 3.7 for more information about this review) to assess progress toward balanced implementation of the Program.

Subject to these conditions, new groundwater and surface water storage will be developed and constructed, together with aggressive implementation of water conservation, recycling, an improved water transfer market, and habitat restoration, as appropriate to meet CALFED Program goals. During Stage 1, through the Water Management Strategy (including the Integrated Storage Investigation) CALFED will continue to evaluate surface water and groundwater storage; identify acceptable site-specific projects; and initiate permitting, NEPA and CEQA documentation, and construction—if all conditions are satisfied.

In addition, groundwater/conjunctive use programs will be developed in tandem with the following actions:

- Groundwater monitoring, and modeling programs are established
- Full recognition is given to the rights of landowners under existing law
- Guidelines are in place to protect resources, address local concerns, and avoid potential impacts prior to and during implementation of a conjunctive management operation.

The CALFED Program has no specific objectives for hydropower generation. However, CALFED does seek to minimize negative impacts on resources, such as hydropower generation, during and after implementation. The Program may result in temporary or long-term changes in river and reservoir operations, which may affect the quantity, timing and value of hydropower produced within the Bay-Delta system. CALFED is coordinating with the Western Area Power Administration to assure that issues are identified and properly framed, so consequences and options are clear to stakeholders, the public, and CALFED.

3.6.6 Water Management Strategy Tools: The Environmental Water Account

The Environmental Water Account (EWA) is part of CALFED's Water Management Strategy, designed to improve fisheries protection and recovery while providing improvements in water quality and water supply reliability. The EWA will rely on more flexible management of water based on real-time needs of the fishery resources. The EWA functions primarily by changing the timing of some flow releases from storage and the timing of water exports from the south Delta pumping plants to coincide with periods of greater or lesser vulnerability of various fish to Delta conditions. The EWA will be established to provide water for protection and recovery of fish beyond water available through existing regulatory actions related to project operations.

EWA and Prescriptive Standards

The EWA is based upon the concept that flexible management of water will achieve fishery and ecosystem benefits more efficiently and to a greater degree than a completely prescriptive regulatory approach. Management of EWA "assets" (water, storage, money, operation rights) on a real-time basis can result in lower overall costs of environmental protection than under a purely prescriptive approach and can provide for enhanced environmental benefits (i.e., restoration and recovery). This would help attain water supply reliability objectives for water users and improve fisheries conditions. In addition, by managing the EWA in close coordination with other parts of the water management strategy, multiple benefits may sometimes be achieved from the use of EWA assets. For example, at times EWA water to achieve a fishery purpose also may provide water quality benefits.

EWA Development

To gain insight into whether and how an EWA could improve fish conditions while protecting water quality and water supply benefits, CALFED Agency staff and stakeholders have simulated numerous EWA /CVPIA operations scenarios. These EWA "gaming" exercises allowed project operators, fishery agency biologists and stakeholders to work together to simulate operational decisions to react to the changing hydrological and biological conditions typical of the Sacramento-San Joaquin watersheds and the Delta. The simulations allowed them to see how the system may respond to potential configurations and applications of EWA assets.

A number of simulations were conducted to better understand how an EWA might have been operated in "real time" if it had existed during the 1981 through 1994 water years. This period included a variable hydrologic sequence of wet years and dry years to test the EWA, but does not reflect all the variation that EWA management could encounter. In each simulation, the EWA had access to a different collection of facilities, contracts, rights, and income. Differing assumptions were also made about the application of CVPIA Section 3406 b(1) and b(2). In

some simulations, the EWA had access to new storage and/or new export pumping capacity. In all simulations the EWA had access to unused project capacity and the ability to allow variances in application of the Export/Inflow standard in order to generate environmental water. In some simulations, the EWA had a budget for water purchases. One simulation was run solely to determine how much water would be required to achieve “adequate” biological protection from the point of view of the fishery agencies.

Changes in operations were simulated using a set of assumed EWA and historical hydrology and fish salvage records, starting from a model representation of project operations with current regulatory conditions.

EWA Structure

During Stage 1, the EWA would work from a foundation of the existing regulatory regime. The EWA would not be a substitute for existing prescriptive standards but would avoid potential new standards. The EWA will be established to provide water for the protection and recovery of fish beyond water available through existing regulatory actions related to project operations. The EWA will benefit water users by providing additional water for fish without the need to reduce

project deliveries. The EWA will be authorized to acquire, bank, transfer and borrow water and arrange for its conveyance. EWA assets will be managed by the federal and state fishery agencies (USFWS, NMFS, and CDFG) in coordination with project operators and stakeholders, through the CALFED Operations Group. Initial acquisition of assets for the EWA will be made and funded by Federal and State agencies (USBR and DWR).

Three Tiers of Environmental Water

Tier 1 - Regulatory Baseline - existing regulation and operational flexibility.

Tier 2 - Environmental Water Account - average 380,000 acre-feet annually with borrowing and payback.

Tier 3 - Additional water only when necessary - a commitment by CALFED agencies to make additional water available should it be needed.

To provide regulatory stability during the initial period of Stage 1, the CALFED agencies will provide a commitment, subject to legal requirements, that for the first four years of Stage 1, there will be no reductions, beyond existing regulatory levels, in CVP or SWP deliveries from the Delta resulting from measures to protect fish under the federal and state Endangered Species Acts. This commitment will be based on the availability of three tiers of assets. Tier 1 is baseline environmental protection, provided by existing regulation and operational flexibility. The regulatory baseline consists of the biological opinions on winter-run chinook salmon and delta smelt, 1995 Delta Water Quality Control Plan, and 800 TAF of CVP Yield pursuant to CVPIA Section 3406(b)(2).

The Regulatory Baseline, Tier 1 Assets:

The regulatory baseline, which provides the assets in Tier 1, consists of:

1993 Winter-run Biological Opinion (NMFS)

1995 Delta Water Quality Control Plan (SWRCB)

- To address the potential, which may arise in rare circumstances, that the CVP obligation under the WQCP exceeds the 450 TAF annual cap for use of (b)(2) water, CALFED agencies will develop a strategy, using their available resources, to create an insurance policy that will seek to eliminate impacts to water users, while not adversely affecting other uses. See drought contingency plan.

1995 Delta Smelt Biological Opinion (FWS)

- The 2-to-1 export/inflow ratio will be met by the CVP and EWA.

Full Use of 800 TAF Supply of Water Pursuant to Section 3406(b)(2) of the CVPIA in accordance with Interior's October 5, 1999 Decision, clarified as follows:

- Water Resulting from Refill of Reservoirs ("Reset"): Water which is available under the (b)(2) Policy as a result of refill of reservoirs following upstream releases ("reset") will not be used in a manner which results in increased export reductions. Upstream releases of (b)(2) water pumped by the SWP and made available to the EWA will not be subject to the "reset" provision.
- Export Curtailments which Result in Increased Storage ("Offset"): Where a prescribed (b)(2) export curtailment results in a reduction in releases from upstream reservoirs and hence increased storage, the charge to the (b)(2) account will be offset to the extent that the increased storage will result in increased delivery (beyond forecast delivery at the time of the export curtailment) to export users in the remainder of the water year. Where the delivery to export users in the remainder of the water year will not be increased and end-of-year storage will be increased, there will be no offset to the charge to the (b)(2) account.

In addition, Tier 1 and Tier 2 assets will be supplemented by flexible operations that do not reduce deliveries to project water users.

Tier 2 consists of the assets in the EWA combined with the benefits of the ERP and is an insurance mechanism that will allow water to be provided for fish when needed without reducing deliveries to water users. Tier 1 and Tier 2 are, in effect, a water budget for the environment and will be used to avoid the need for Tier 3 assets. It is unlikely that assets beyond those in Tier 1 and Tier 2 will be needed to meet ESA requirements. However, if further assets are needed in specific circumstances, a third tier will be provided. Tier 3 is based upon the commitment and ability of the CALFED agencies to make additional water available should it be needed. In considering the need for Tier 3 assets, the fishery agencies will consider the views of an independent science panel. Tier 3 assets may include additional purchases from willing sellers or consensual "borrowing" of water beyond the collateral-based borrowing which is allowed as part of the EWA (Tier 2).

Environmental Water Account Tier 2 Initial Assets

Action Description	Water Available Annually (Average)
SWP Pumping of (b)(2)/ERP Upstream Releases ¹	40,000 acre-feet ²
EWA Use of Joint Point ³	75,000 acre-feet
Export/Inflow Ratio Flexibility	30,000 acre-feet
500 cfs SWP Pumping Increase	50,000 acre-feet
Purchases - South of Delta	150,000 acre-feet
Purchases - North of Delta ⁴	35,000 acre-feet
TOTAL	380,000 acre-feet

Immediate development of assets for the first year is critical to EWA success. Initial water purchases and lease of groundwater storage will be secured from willing sellers by the end of 2000. In addition to assets to be acquired annually, as shown in the table above, an initial one-time deposit of water equivalent to 200 TAF of south-of-Delta storage will be acquired from a variety of sources to assure the effectiveness of the EWA and provide assurances for SWP and CVP water supply/deliveries.

Borrowing agreements will allow the EWA to borrow water from the Projects for necessary actions during a water year as long as the water can be repaid without affecting the following year's allocations. To the extent practicable, borrowing from the SWP and CVP will be equitably shared. The limitations on borrowing will be developed as part of the agreement.

Source shifting agreements with south-of-Delta water providers for 100 TAF will be used to enhance the effectiveness of the EWA, and to help provide assurance that SWP and CVP water deliveries and operations will not be affected by EWA operations.

¹ The EWA and the SWP will share equally the (b)(2) and ERP upstream releases pumped by the SWP after they have served their (b)(2) and ERP purposes.

² The amount of water derived from the first four actions will vary based on hydrologic conditions.

³ The EWA will share access to joint point, with the CVP receiving 50% of the benefits.

⁴ This is the amount of water targeted for the first year; higher amounts are anticipated in subsequent years.

The ESA commitment will be in effect for four years based on ERP implementation and all of the agreed upon assets being available in that period. It is anticipated that sufficient assets, either from existing sources or from supply augmentation, will be available for the protection of fish beyond the first four years, and that the commitment will be extended. The only exception to this commitment would arise in the extremely unlikely event that, despite the utilization of all measures available in the three tiers, a determination is made that a situation of jeopardy to a listed species nevertheless is likely.

The EWA would make use of all of the water management tools as shown in the previous table. Especially in its first few years of operation, a substantial portion of the assets needed for the EWA will come from access to existing Project flexibility, new changes in project flexibility (joint point of diversion, export/inflow [E/I] ratio flexibility, etc.) and through voluntary purchases (estimated at \$50 million annually) on the water transfer market. Given these market based water transfers, the EWA will have an effect on the cost and availability of water transfer capacity.

Generally it appears that the EWA “performance” increases as the EWA’s access to surface and groundwater storage increases. Flexibility in project operations and improvements in conveyance facilities can both help deliver environmental water at the desired place and time and can help create new EWA “assets.” This flexibility is essential for the EWA for it must be operated in tandem with (b)(1), (b)(2) and (b)(3) water provided under Section 3406 of the CVPIA. Finally, the EWA cannot function without the comprehensive monitoring program envisioned in CALFED’s Science Program.

Water quality concerns must also be considered in managing the EWA. Operational changes to enhance the protection of aquatic resources and maintain export supplies have the potential to affect water quality, either positively or negatively. Management of the EWA must be coordinated closely with operation of the State and Federal water projects and the CALFED Water Quality Program.

The EWA will provide fisheries protection and recovery while providing improvements in water supply reliability primarily by changing the timing of some flow releases from storage and the timing of water exports from the south Delta pumping plants. These real-time operational changes will be dependent on assessment of and response to varying conditions. For example, water exports from the Delta may be reduced at times when certain fish species are most vulnerable to this pumping and may be increased when the fish are less vulnerable. The timing of operational changes would vary from year to year depending on many factors such as hydrology and real-time monitoring that shows the movement and presence of fish. Examples of how the EWA may use its assets follows:

- If additional export reductions are needed to protect Delta smelt during late May and June, the EWA compensates for the quantity of export foregone by turning over to State and Federal Project water users EWA water previously pumped and now stored in San Luis Reservoir. If the EWA had not previously stored water in San Luis Reservoir it would temporarily borrow stored State and/or Federal water in San Luis Reservoir.
- Since EWA is not allowed to cause any new delivery reductions, it must pay back most or all of the borrowed water in time to avoid impact on the current year’s deliveries or the following year’s allocations.

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- The EWA would repay the loan using various available assets. It might:
 - ▶ Use EWA groundwater supplies in the export area.
 - ▶ Invoke water purchase contracts in the export area.
 - ▶ Invoke agreements with local agencies in the export area whereby the agencies have agreed to meet some part of their water use from local sources (groundwater or surface storage) until after the low point in San Luis Reservoir storage is passed.
 - ▶ Relax the E/I standard to move more water to the export area.
 - If the San Luis low point could be passed without the repayment of all the debt, the EWA might carry the debt into the next winter in the hopes that high Delta inflows would allow San Luis Reservoir to refill without additional EWA expenditures.
 - EWA water held upstream can be released to improve instream conditions below the reservoirs and then either, 1) be pumped from the Delta to pay off an EWA debt in San Luis Reservoir or add to EWA water stored there, or 2) left to provide increased Delta outflow.

The CALFED Program will coordinate with EWA implementing agencies (DFG, USFWS and NMFS) to ensure CALFED objectives are being met. Coordination and consultation efforts among the CALFED Operations Group, project operations, ESA management agencies, the ERP program manager and stakeholder groups are intended to ensure that the environmental water acquisitions are consistent with the CALFED program goals and objectives and that conflicts with ESA requirements and project operations are minimized or avoided.

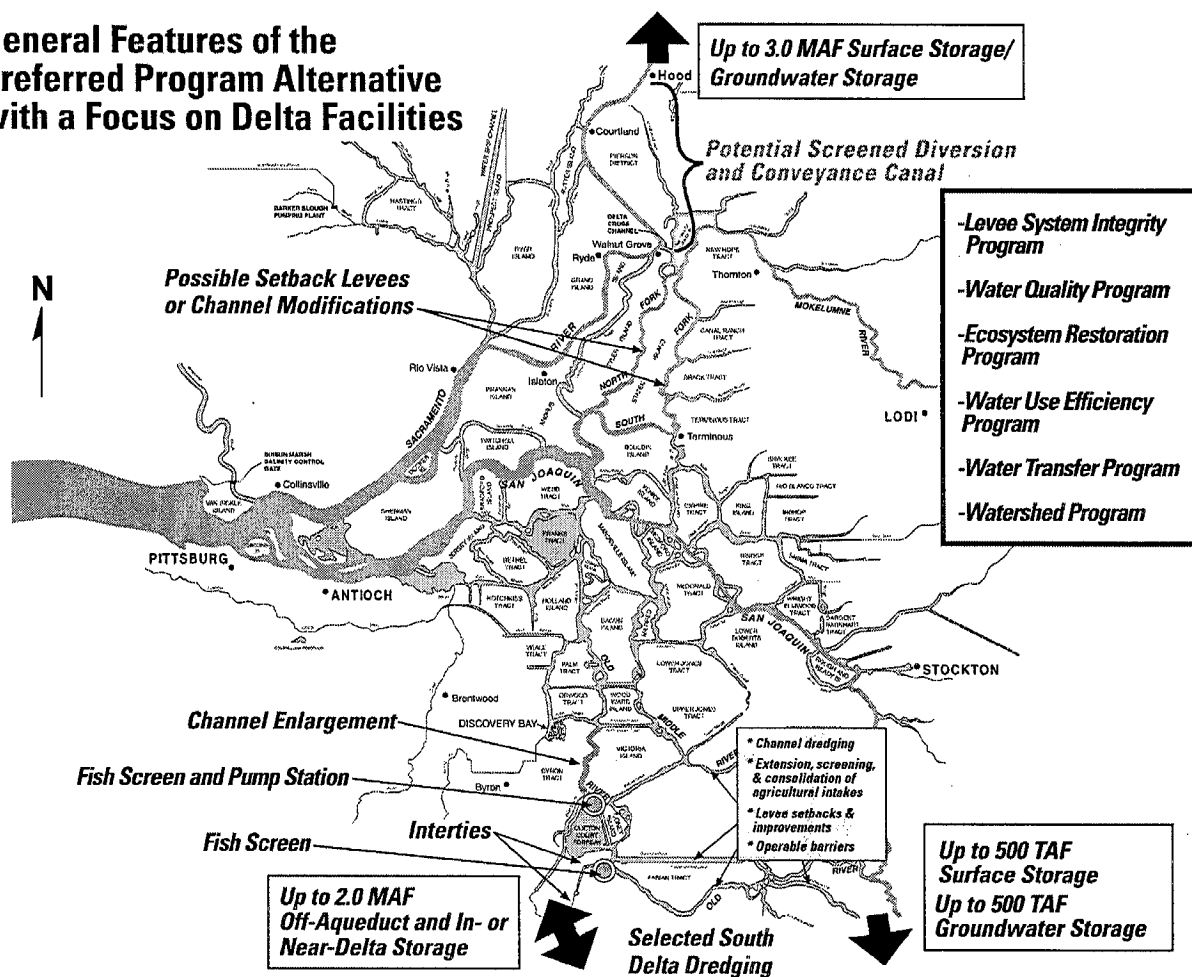
CALFED expects that, as EWA assets become more secure, the regulatory assurances provided during the first four years of Stage 1 will be extended throughout Stage 1. CALFED will develop rules for storing, conveying, and borrowing of EWA water. At the same time, CALFED will develop an accounting process to track the EWA water. Like other parts of the CALFED Program, the EWA will be adaptively managed as experience is gained with its use and effectiveness. In the future, the EWA may gain additional assets as new facilities are implemented or operational changes are made. How EWA will share in the use of these facilities will be determined as these are developed.

3.7 The Preferred Program Alternative

The Preferred Program Alternative consists of a set of broadly described programmatic actions which set the long-term, overall direction of the CALFED Program. The description is programmatic in nature, intended to help agencies and the public make decisions on broad methods to meet Program purposes. The preferred program alternative is made up of the Levee System Integrity Program, Water Quality Program, Ecosystem Restoration Program, Water Use Efficiency Program, Water Transfers Program, Watershed Program, Storage and Conveyance.

Even in this broad programmatic description, actions are intended to take place in an integrated framework and not independently of the other programs. While each program element is described individually, it is understood that only through coordinated, linked, incremental

General Features of the Preferred Program Alternative with a Focus on Delta Facilities



investigation, analysis and implementation can we effectively resolve problems in the Bay-Delta system.

Accordingly, CALFED will annually review the status of implementation of all actions, the progress toward achievement of all goals and objectives, and compliance with Program schedules and financing agreements pertaining to the CALFED Program. In all Program areas, funds for implementation of the Program will continue to be available only if implementation of all actions, progress toward achievement of all goals and objectives, and compliance with schedules and financing agreements are occurring in a balanced manner. In the event that either the Governor or the Secretary of the Interior determines that the Program has not substantially adhered to this balanced implementation, then the Governor and the Secretary will develop and approve a revised program schedule and budget to achieve balanced implementation.

Levee System Integrity Program

The focus of the Levee System Integrity Program is to improve levee stability to benefit all users of Delta water and land. Actions described in this program element protect water supply reliability by maintaining levee and channel integrity. Levee actions will be designed to provide simultaneous improvement in habitat quality, which will indirectly improve water supply reliability. Levee actions also protect water quality, particularly during low flow conditions when a catastrophic levee breach would draw salty water into the Delta.

There are five main parts to the levee program plus Suisun Marsh levee rehabilitation work:

- Delta Levee Base Level Protection Plan - Improve and maintain Delta levee system stability to meet the Corps' PL 84-99 levee standard.
- Delta Levee Special Improvement Projects - Enhance flood protection for key islands that provide statewide benefits to the ecosystem, water supply, water quality, economics, infrastructure, etc.
- Delta Levee Subsidence Control Plan - Implement current best management practices (BMPs) to correct subsidence adjacent to levees and coordinate research to quantify the effects and extent of inner-island subsidence.
- Delta Levee Emergency Management and Response Plan - The emergency management and response plan will build on existing state, federal, and local agency emergency management programs.
- Delta Levee Risk Assessment - Perform a risk assessment to quantify the major risks to Delta resources from floods, seepage, subsidence and earthquakes, evaluate the consequences, and develop recommendations to manage the risk.
- Suisun Marsh Levees - Rehabilitate Suisun Marsh levees.

Water Quality Program

The CALFED Program is committed to achieving continuous improvement in the quality of the waters of the Bay-Delta System with the goal of minimizing ecological, drinking water and other water quality problems, and to maintaining this quality once achieved. Improvements in water quality will result in improved ecosystem health, with indirect improvements in water supply reliability. Improvements in water quality also increase the utility of water, making it suitable for more uses.

The Water Quality Program includes the following actions:

- Drinking water parameters - Reduce the loads and/or impacts of bromide, total organic carbon, pathogens, nutrients, salinity, and turbidity through a combination of measures that include source reduction, alternative sources of water, treatment, storage and if necessary, conveyance improvements such as a screened diversion structure (up to 4000 cfs) on the Sacramento River. The Conveyance section of this document includes a discussion of this potential improvement.
- Pesticides - Reduce the impacts of pesticides through (1) development and implementation of BMPs, for both urban and agricultural uses; and (2) support of pesticide studies for regulatory agencies, while providing education and assistance in implementation of control strategies for the regulated pesticide users.
- Organochlorine pesticides - Reduce the load of organochlorine pesticides in the system by reducing runoff and erosion from agricultural lands through BMPs.
- Trace metals - Reduce the impacts of trace metals, such as copper, cadmium, and zinc, in upper watershed areas near abandoned mine sites. Reduce the impacts of copper through urban storm water programs and agricultural BMPs.
- Mercury - Reduce mercury levels in rivers and the estuary by source control at inactive and abandoned mine sites.
- Selenium - Reduce selenium impacts through reduction of loads at their sources and through appropriate land fallowing and land retirement programs.
- Salinity - Reduce salt sources in urban and industrial wastewater to protect drinking and agricultural water supplies, and facilitate development of successful water recycling, source water blending, and groundwater storage programs. Salinity in the Delta will be controlled both by limiting salt loadings from its tributaries, and through managing seawater intrusion by such means as using storage capability to maintain Delta outflow and to adjust timing of outflow, and by export management.
- Turbidity and sedimentation - Reduce turbidity and sedimentation, which adversely affect several areas in the Bay Delta and its tributaries.
- Low dissolved oxygen - Reduce the impairment of rivers and the estuary from substances that exert excessive demand on dissolved oxygen.

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- Toxicity of unknown origin - Through research and monitoring, identify parameters of concern in the water and sediment and implement actions to reduce their impacts to aquatic resources.

Ecosystem Restoration Program

The goal of the Ecosystem Restoration Program is to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta system to support sustainable populations of diverse and valuable plant and animal species. In addition, the Ecosystem Restoration Program, along with the water management strategy, is designed to achieve or contribute to the recovery of listed species found in the Bay-Delta and, thus, achieve goals in the Multi-species Conservation Strategy. Improvements in ecosystem health will reduce the conflict between environmental water use and other beneficial uses, and allow more flexibility in water management decisions.

The Ecosystem Restoration Program identifies programmatic actions designed to restore, rehabilitate, or maintain important ecological processes, habitats, and species within 14 ecological management zones. Implementation of these programmatic actions will be guided by six goals presented in the Strategic Plan for Ecosystem Restoration. Nearly 100 restoration objectives have been developed which are directly linked to one of the six goals. Each objective further defines the restoration approach for each ecological process, habitat, species or ecosystem stressor. One to several restoration targets have been developed for each objective to set more specific or quantified restoration levels.

Long-term implementation of the Ecosystem Restoration Program will be guided by the adaptive management approach described in the Strategic Plan for Ecosystem Restoration. This approach to restoration will require review by an Ecosystem Restoration Science Review Panel and will rely on information developed in the Comprehensive Monitoring, Assessment, and Research Program.

Representative Ecosystem Restoration Program actions include:

- Protecting, restoring, and managing diverse habitat types representative of the Bay-Delta and its watershed.
- Acquiring water from sources throughout the Bay-Delta's watershed to provide flows and habitat conditions for fishery protection and recovery.
- Restoring critical in-stream and channel-forming flows in Bay-Delta tributaries.
- Improving Delta outflow during key periods.
- Reconnecting Bay-Delta tributaries with their floodplains through the construction of setback levees, the acquisition of flood easements, and the construction and management of flood bypasses for both habitat restoration and flood protection.

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- Developing assessment, prevention and control programs for invasive species.
 - Restoring aspects of the sediment regime by relocating in-stream and floodplain gravel mining, and by artificially introducing gravels to compensate for sediment trapped by dams.
 - Modifying or eliminating fish passage barriers, including the removal of dams, construction of fish ladders, and construction of fish screens that use the best available technology.
 - Targeting research to provide information that is needed to define problems sufficiently, and to design and prioritize restoration actions.

Water Use Efficiency Program

The Water Use Efficiency Program includes actions to assure efficient use of existing and any new water supplies developed by the Program. Efficiency actions can alter the pattern of water diversions and reduce the magnitude of diversions, providing ecosystem benefits. Efficiency actions can also result in reduced discharge of effluent or drainage, improving water quality.

The Water Use Efficiency Program will build on the work of the existing Agricultural Water Management Council and California Urban Water Conservation Council process, supporting and supplementing those processes through planning and technical assistance and through targeted financial incentives (both loans and grants). The Water Use Efficiency Program has identified potential recovery of currently irrecoverable water losses of over 1.4 million acre-feet of water annually by 2020 as a result of CALFED actions. Before execution of the Record of Decision, CALFED will identify measurable goals and objectives for its urban and agricultural water conservation program, water reclamation programs and managed wetlands programs.

Water conservation-related actions include:

- Implement agricultural and urban conservation incentives programs to provide grant funding for water management projects that will provide multiple benefits which are cost-effective at the state-wide level, including improved water quality and reduced ecosystem impacts.
- Identify, in region-specific strategic plans for agricultural areas, measurable objectives to assure improvements in water management.
- Expand state and federal programs to provide increased levels of planning and technical assistance to local water suppliers.
- Work with the Agricultural Water Management Council (AWMC) to identify appropriate agricultural water conservation measures, set appropriate levels of effort, and certify or endorse water suppliers that are implementing locally cost-effective feasible measures.

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- Work with the California Urban Water Conservation Council (CUWCC) to establish an urban water conservation certification process and set appropriate levels of effort in order to ensure that water suppliers are implementing cost-effective feasible measures.
 - Help urban water suppliers comply with the Urban Water Management Planning Act.
 - Identify and implement practices to improve water management for wildlife areas
 - Gather better information on water use, identify opportunities to improve water use efficiency, and measure the effectiveness of conservation practices.
 - Conduct directed studies and research to improve understanding of conservation actions.

Water recycling actions include:

- Help local and regional agencies comply with the water recycling provisions in the Urban Water Management Planning Act.
- Expand state and federal recycling programs to provide increased levels of planning, technical, and financing assistance (both loans and grants) and to develop new ways of providing assistance in the most effective manner.
- Provide regional planning assistance that can increase opportunities for the use of recycled water.

Water Transfer Program

The Water Transfer Program proposes a framework of actions, policies, and processes that, collectively, will facilitate water transfers and the further development of a state-wide water transfer market. The framework also includes mechanisms to provide protection from third party impacts. A transfers market can improve water availability for all users, including the environment. Transfers can also help to match water demand with water sources of the appropriate quality, thus increasing the utility of water supplies.

The Water Transfer Program will include the following actions and recommendations:

- Establish a California Water Transfer Information Clearinghouse to provide a public informational role. The clearinghouse would 1) ensure that information regarding proposed transfers is publically disclosed and, 2) perform on-going research and data collection functions to improve the understanding of water transfers and their potential beneficial and adverse effects.
- Require water transfer proposals submitted to the Department of Water Resources, the U.S. Bureau of Reclamation, or the State Water Resources Control Board to include analysis of potential groundwater, socio-economic, or cumulative impacts as warranted by individual transfers.
- Streamline the water transfer approval process currently used by the Department of Water Resources, the U.S. Bureau of Reclamation, or the State Water Resources Control Board.

This would include clarifying and disclosing current approval procedures and underlying policies as well as improving the communication between transfer proponents, reviewing agencies, and other potentially affected parties.

- Refine quantification guidelines used by water transfer approving agencies when they are reviewing a proposed water transfer. This will include resolving issues between stakeholders and approving agencies regarding the application of current agency-based quantification criteria.
- Improve the accessibility of state and federal conveyance and storage facilities for the transport of approved water transfers.
- Clearly define carriage water requirements and resolve conflicts over reservoir refill criteria such that transfer proponents are acutely aware of the implications of these requirements.
- Identify appropriate assistance for groundwater protection programs through interaction with CALFED agencies, stakeholders, the legislature and local agencies. This is intended to assist local agencies in the development and implementation of groundwater management programs that will protect groundwater basins in water transfer source areas.
- Establish new accounting, tracking, and monitoring methods to aid instream flow transfers under California Water Code Section 1707.

Watershed Program

The Watershed Program provides assistance, financial and technical, to local watershed programs that benefit the Bay-Delta system. Watershed actions can improve reliability by shifting the timing of flows, increasing base flows and reducing peak flows. This also helps to maintain levee integrity during high flow periods. Other watershed actions will improve water quality by reducing discharge of parameters of concern.

The Watershed Program includes the following elements:

- Support local watershed activities - Implement watershed restoration, maintenance, and conservation activities that support the goals and objectives of the Program including improved river functions.
- Facilitate coordination and assistance - Facilitate and improve coordination and assistance between government agencies, other organizations, and local watershed groups.
- Develop watershed monitoring and assessment protocols - Facilitate monitoring efforts that are consistent with the CALFED's protocols and support watershed activities that ensure that adaptive management processes can be applied.
- Support education and outreach - Support resource conservation education at the local watershed level, and provide organizational and administrative support to watershed programs.

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- Define watershed processes and relationships - Identify the watershed functions and processes that are relevant to the CALFED goals and objectives, and provide examples of watershed activities that could improve these functions and processes.

Storage

Groundwater and surface water storage can be used to improve water supply reliability, provide water for the environment at times when it is needed most, provide flows timed to maintain water quality, and protect levees through coordinated operation with existing flood control reservoirs.

Decisions to construct groundwater or surface water storage will be predicated on compliance with all environmental review and permitting requirements, and maintaining balanced implementation of all Program elements. CALFED will undertake an annual review (see the third paragraph of Section 3.7 for more information about this review) to assess progress toward balanced implementation of the Program.

Subject to these conditions, new groundwater and surface water storage will be developed and constructed, together with aggressive implementation of water conservation, recycling, an improved water transfer market, and habitat restoration, as appropriate to meet CALFED Program goals. During Stage 1, through the Water Management Strategy (including the Integrated Storage Investigation) CALFED will continue to evaluate surface water and groundwater storage; identify acceptable site-specific projects; and initiate permitting, NEPA and CEQA documentation, and construction—if all conditions are satisfied.

The total volume of new or expanded surface water and groundwater storage evaluated by CALFED ranges up to 6 million acre feet, and facility locations being considered are located in the Sacramento and San Joaquin Valleys and in the Delta. A list of sites for further consideration is included in the Phase II Report.

Conveyance

The preferred program alternative employs a through-Delta approach to conveyance. Modifications in Delta conveyance will result in improved water supply reliability, protection and improvement of Delta water quality, improvements in ecosystem health, and reduced risk of supply disruption due to catastrophic breaching of Delta levees. The proposed through-Delta conveyance facility actions include:

- Construction of a new screened intake at Clifton Court Forebay with protective screening criteria.

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- Construction of either a new screened diversion at Tracy with protective screening criteria; and/or an expansion of the new diversion at Clifton Court Forebay to meet the Tracy Pumping Plant export capacity.
 - Implementation of the Joint Point of Diversion for the SWP and CVP, and construction of interties.
 - Construction of an operable barrier at the head of Old River to improve conditions for salmon migrating up and down the San Joaquin River.
 - Construction of operable barriers taking into account fisheries, water quality and water stage needs in the south Delta.
 - Operational changes to the SWP operating rules to allow export pumping up to the current physical capacity of the SWP export facilities.

Under the Preferred Program Alternative, north Delta improvements include:

- Studying and evaluating a screened diversion facility on the Sacramento River with a range of diversion capacities up to 4,000 cfs as a measure to improve drinking water quality in the event that the Water Quality Program measures do not result in continuous improvements toward CALFED drinking water goals.

The diversion facility on the Sacramento River likely would include a fish screen, pumps, and a channel between the Sacramento and Mokelumne Rivers. The diversion facility on the Sacramento River is an action to be considered only after three separate assessments are satisfactorily completed: first, a thorough assessment of Delta Cross Channel (DCC) operation strategies and confirmation of continued concern over water quality impacts from DCC operations; second, a thorough evaluation of the technical viability of a diversion facility; and third, satisfactory resolution of the fisheries concerns about a diversion facility. The assessments of the Delta Cross Channel and the diversion facility on the Sacramento River will be completed simultaneously. The results of all three of these evaluations will be shared with the Delta Drinking Water Council or its successor and the expert panel evaluating fish impacts of Delta conveyance. If these evaluations demonstrate that a diversion facility on the Sacramento River is necessary to address drinking water quality concerns and can be constructed without adversely affecting fish populations, the facility will be constructed as a part of the Preferred Program Alternative.

- Construct new setback levees, dredge and/or improve existing levees along the channels of the lower Mokelumne River system from Interstate 5 downstream to the San Joaquin River.

The Preferred Program Alternative includes a process for determining the conditions under which any future additional conveyance facilities or water management actions would be taken. The process would include:

- An evaluation of how water suppliers can best provide a level of public health protection equivalent to Delta source water quality of 50 parts per billion (ppb) bromide and 3 parts per million (ppm) TOC.
- An evaluation based on two independent expert panels' reports -- one on the Program's progress toward these measurable water quality goals and the second on CALFED's progress toward ecosystem restoration objectives, with particular emphasis on fisheries recovery.

3.8 The CALFED Program and Related Actions

The Preferred Program Alternative is broad, ambitious, and long-term, but by itself does not fully describe the resource management activities of CALFED agencies. Each of the State and Federal CALFED agencies listed in Chapter 1 has responsibilities and authorities that are outside of, but complementary to, the CALFED Bay-Delta Program. No description of comprehensive resource management activities in California is complete without mention of the complementary actions being planned and carried out by State and Federal agencies. This section provides a perspective of how the CALFED Program will be implemented in the broader context of statewide resource management.

3.8.1 Complementary Actions

The actions described in the CALFED Program will be implemented in a solution area that includes most of the state. Individual CALFED agencies have responsibilities and authorities both within and outside the CALFED solution area. Within the defined CALFED solution area, individual CALFED agencies will implement actions that are part of CALFED's preferred program alternative as well as actions that are not part of the CALFED Program. Many of these actions will be complementary to the CALFED Program, and will help to achieve CALFED goals and objectives. Many of these complementary actions are not included in the CALFED Program because they were already underway when the CALFED effort was started in 1995. In these cases, CALFED programmatic actions have been designed to complement or supplement these existing actions and programs.

Other actions will continue to be developed by individual CALFED agencies over time. These new actions and programs will be outside the programmatic analysis of impacts that CALFED has prepared. These new actions will require more extensive environmental review than CALFED actions because impact analysis of new actions will not be able to tier from the CALFED programmatic analysis.

Some examples of these complementary actions will help to illustrate the relationship of CALFED actions and complementary actions of the CALFED agencies.

Comprehensive Study In response to extensive flooding and damages experienced in 1997, the United States Congress authorized the U.S. Army Corps of Engineers to provide a comprehensive analysis of the Sacramento and San Joaquin River basin flood management system and to partner with the State of California to develop a plan for flood management into the 21st century. The Corps and the Reclamation Board of the State of California are leading a Comprehensive Study to improve flood management and integrate ecosystem restoration in the Sacramento and San Joaquin River basins.

The Comprehensive Study will develop master plans that will increase flood protection and improve the ecosystem on major rivers and tributaries in the Central Valley. These plans will include an implementation strategy that will allow immediate execution of improvements to the system. Because this study is the first system-wide evaluation of the flood management systems in the Central Valley, it represents a change in how projects are identified, selected and implemented. It will look at the program from a system-wide perspective as opposed to site-specific projects.

The CALFED Ecosystem Restoration Program also has a system-wide perspective, so the ERP and the Comprehensive Study lend themselves to coordinated implementation. The result can be implementation of actions that provide multiple benefits, meeting ERP goals and objectives while at the same time managing the risk of catastrophic flooding in the Sacramento-San Joaquin system. The Comprehensive Study is not yet completed so no actions have been selected for implementation. However, several CALFED actions stand out as possibilities for coordinated implementation to meet multiple objectives. These include completion of a Sacramento River meander corridor, restoration of flood plain processes on Deer Creek (an east side tributary that enters the Sacramento river near Corning) and floodplain restoration on the lower San Joaquin River.

Anadromous Fish Restoration Program The Central Valley Project Improvement Act was enacted by Congress in 1992. Two CALFED agencies, the U. S. Fish and Wildlife Service and the U. S. Bureau of Reclamation, are jointly responsible for carrying out the CVPIA. The Act includes provisions to restore anadromous fish populations, improve and facilitate water transfers, implement water conservation actions, provide water for wildlife refuges in the Central Valley, and improve flows on the Trinity River for anadromous fish. Many of the CVPIA provisions parallel elements of the CALFED program. The Ecosystem Restoration Program, Water Transfers program, Water Use Efficiency Program, and water project operations for Stage 1 would complement programs with similar goals under the CVPIA.

One provision of the Act directs the implementation of a program which makes all reasonable efforts to ensure that, by 2002, natural production of anadromous fish in Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during the period of 1967-1991. To achieve this goal, the CVPIA Anadromous Fish Restoration Program, or AFRP, will carry out instream and Delta habitat and flow improvements. The flow improvements were based upon information developed by the U. S. Fish and Wildlife Service in 1996. CALFED has incorporated these flow improvement targets into its Ecosystem Restoration Program. Both the AFRP and the CALFED ERP will make water acquisitions, and the two programs will coordinate water acquisitions to provide increased instream flows in specific stream reaches during specific periods to improve habitat conditions.

Facilitation of Water Transfers In addition to CALFED actions related to water transfers, one important complementary action will be an effort to remove a potential barrier to water transfers.

CALFED agencies recognize that a potential barrier to an effective water transfer market is the lack of incentive for some individual landowners to implement agricultural water conservation technologies as a result of water savings frequently accruing to the irrigation district or water supply agency, not to the landowner. In conjunction with USBR and SWRCB, DWR will develop and support proposals that work within California's existing system of water rights to remove this disincentive where needed. DWR will work with water supply agencies and end users to find consensus solutions.

San Luis Bypass One important complementary action in the San Francisco Bay Area is a bypass canal to the San Felipe Unit at the San Luis Reservoir. When operated in conjunction with local storage, this canal would allow Santa Clara Valley Water District to receive water directly from the Delta pumping facilities, thereby avoiding water quality problems associated with the "low point" water levels in San Luis Reservoir.

Bay Area Blending/Exchange A programmatic action with the potential to improve water quality for many urban users is a Bay Area Blending/Exchange project. It would enable Bay Area water districts to work cooperatively to address water quality and supply reliability concerns on a consensual basis. Water supply agencies in the Bay Area have different water sources and different water supply and water quality concerns. This is an "umbrella" project that will evaluate a range of potential changes to existing infrastructure and institutional arrangements to encourage a regional approach to water supply operations. An example is the possibility of building "interconnects" between agency supply aqueducts, so that water suppliers can take advantage of different sources when water quality is highest (e.g., existing and/or additional Sierra sources). Depending on specific local actions selected, a Bay Area Blending/Exchange project might or might not be able to tier off of CALFED's Programmatic EIS/EIR.

Land Retirement A complementary action in the Westside San Joaquin Valley will be voluntary land retirement programs carried out by USBR as part of the CVPIA.

Regional Exchanges Another complementary action would facilitate water quality exchanges and similar programs to make high quality Sierra water in the eastern San Joaquin Valley available to urban Southern California interests. The Metropolitan Water District of Southern California and the Friant Water Users Authority and its member agencies have commenced preliminary discussions to accomplish these objectives, as well as improving water supply reliability for the agricultural districts. CALFED will work to assure that these efforts are consistent with overall programs to restore the upper San Joaquin River and maintain water quality for downstream users.

3.8.2 A Single Blueprint for Ecosystem Restoration

The relationship between the ERP and other plans and regulatory actions affecting restoration, species recovery, and habitat conservation for species dependent on the Delta is a critical issue affecting the potential success of the CALFED Program. How the ERP is implemented over time relative to other restoration and species recovery actions affecting species dependent on the Delta will strongly influence support for, and thus the ultimate success of, the ERP, and the CALFED program as a whole.

The establishment of a single blueprint for ecosystem restoration and species recovery in the Bay-Delta System is a key ingredient for a successful and effective restoration program. A blueprint is the vehicle for ensuring coordination and integration -- not only within the CALFED Program, but among all resource management, conservation, and regulatory actions affecting the Bay-Delta System, including those described above.

With this approach in mind, CALFED has developed a single blueprint framework for development and implementation of the Ecosystem Restoration Program (ERP). This single blueprint is a unified and cooperative approach defined by three primary elements:

- integrated, shared science and a set of clearly explained ecological conceptual models to provide a common basis of understanding about how the ecosystem works;
- a shared vision for a restored ecosystem ; and
- a management framework, which defines how parties with management and regulatory authorities affecting the Delta will interact and how management and regulatory decisions (including planning, prioritization, and implementation) will be coordinated and integrated over time.

The integrated science and ecological conceptual models provide a common basis of understanding about how the ecosystem works. These elements, which would include competing hypotheses and models, represent the foundation for transparent decision making based upon sound science. This is not to imply that these models are fixed, as they will be tested and modified over time in response to new information in accordance with the principles of adaptive management as part of the CALFED Science Program. Rather, the models represent a basis for guiding management and regulatory decisions at a given point in time. They also provide the rationales for these decisions.

The shared vision for ecological restoration serves to define the desired outcome. While each of the management and regulatory programs have their own distinct set of objectives, establishing a unified approach requires that in meeting these objectives the various programs also contribute to meeting common objectives with respect to ecosystem restoration. The objectives for ecological

restoration and species conservation established in the ERP and MSCS provide a broad set of objectives that can provide the common vision for the single blueprint concept.

The management framework defines how parties will interact and how management and regulatory decisions will be coordinated and integrated over time. The management framework is designed to foster coordinated and consistent decision making over time. This management framework must be flexible, incorporating and responding to new information and changing Bay-Delta conditions. The framework must be designed to promote coordinated planning, prioritization, and implementation. It must also incorporate provisions for resolving management and regulatory conflicts that may arise. A separate appendix to the Programmatic EIR/EIS, the *Strategic Plan for Ecosystem Restoration*, provides a general proposed management framework for promoting integration and the concept of a single blueprint approach. (The management framework for the single blueprint is one of several structures/agreements needed to ensure implementation of a new governance structure and decision-making process. The CALFED Governance Plan is further described in Chapter 4 of the Implementation Plan.)

Integration with Related Programs

This single blueprint will be shared not only by the CALFED agencies carrying out ecosystem restoration, but also by all related CALFED programs including Water Quality, Water Use Efficiency, and Levee Restoration. For example, many of the actions in the Water Quality Program are staged to provide improvements and insights critical to the Ecosystem Restoration Program. Likewise, the ERP has located and staged many of its actions to complement the Water Quality Program. This approach also facilitates the development of scientific monitoring and research efforts that can strengthen adaptive management decisions across all CALFED programs, not only the ERP.

Water management decisions for the ERP will be made and carried out in close coordination with overall CALFED water operations in the Bay-Delta system and its tributaries. Through the ERP Water Acquisition Program, implementation of flow actions and water acquisition for the ERP will be carried out in concert with the overall CALFED water management strategy, and most directly with operation of the Environmental Water Account. In this way, restoration actions and operations will be integrated to the extent possible to simultaneously maximize the flows in the system for environmental benefit while preserving the stability of the water supply for all other uses.

Since the integrity of the levee system in the Delta is a critical ingredient in restoring the diversity of estuarine habitats in the Delta, as well as preserving water quality for urban and agricultural uses, the restoration actions being developed in the North and South Delta and upper reaches of the Bay will be developed in close coordination with both the CALFED Levee

Program and all other complementary programs, including the Comprehensive Flood Management Study.

The Watershed Program will play a key role in implementing the CALFED blueprint at the regional level. Through the Watershed Program, local watershed organizations will be better coordinated and engaged in the planning and implementation of the CALFED Program. In the lower watershed, the focus will be on ecosystem restoration and water quality actions. In the upper watershed, the immediate focus will be on partnership projects with local entities to improve water quality and habitat, decrease erosion, and increase base flows in the tributaries to the Delta.

Key related programs and regulatory activities that will be connected through the single blueprint include those listed below. Authority and responsibility for each program or activity will continue to reside with the designated entity; coordination and integration will be improved under the single blueprint concept.

CALFED Related Programs

- Central Valley Project Improvement Act
- Central Valley Joint Venture
- Sacramento River Conservation Area (SB 1086, Upper Sacramento River Fisheries and Riparian habitat Management Plan)
- The Sacramento and San Joaquin Basins Comprehensive Study
- Endangered Species Act (ESA) Recovery Plans
- San Joaquin River Management Plan
- Prop. 12 Program, including flood corridor protection program, river parkways program, non-point source pollution program, watershed protection program and the flood protection program

Regulatory Activities

- Reclamation Board permitting
- ESA biological opinions relating to water project operations, in-channel activities and riparian areas that support species dependent on the Delta
- California Endangered Species Act (CESA) permitting involving species dependent on the Delta
- Water quality regulatory activities (e.g. National Pollutant Discharge Elimination System permitting, Total Maximum Daily Loads, etc.)
- Natural Community Conservation Plans
- Clean Water Act Section 404 and Rivers and Harbors Act permitting
- Federal Energy Regulatory Commission licensing
- Habitat Conservation Plans